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Table of Contents.

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ORIGINAL ARTICLES—	Page.	BRITISH MEDICAL ASSOCIATION NEWS—	Page.
The Individual and the Environment, by A. A. Abbie	321	Scientific	348
The Hypothalamus and Obesity, by Chandler Brooks	327	PUBLIC HEALTH—	
Inguinal Hernia: A Review of Treatment, by Gerald Brosnan, F.R.C.S., F.R.A.C.S.	331	National Health and Medical Research Council: Streptomycin Committee	349
Tuberculosis of the Upper Part of the Respiratory Tract, with a Report of a Case, by David B. Rosenthal, M.D., M.R.C.P.	335	MEDICAL SOCIETIES—	
REPORTS OF CASES—		Melbourne Pædiatric Society	351
Four Cases of Carditis Occurring in Children and Associated with the Administration of a Foreign Serum, by Joan Storey	337	OBITUARY—	
REVIEWS—		William John Stewart McKay	353
Penicillin Treatment	339	POST-GRADUATE WORK—	
The Pathology of Labour	339	The Melbourne Permanent Post-Graduate Committee	355
Gynaecology and Female Urology	340	THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS—	
LEADING ARTICLES—		Fourth Award of Gordon Craig Scholarships	356
The Plebiscite of the Profession in England and What it Means	341	NOMINATIONS AND ELECTIONS	356
CURRENT COMMENT—		MEDICAL APPOINTMENTS	356
Erythema Nodosum	342	BOOKS RECEIVED	356
The Viability of Treponema Pallidum	343	DIARY FOR THE MONTH	356
Melbourne Medical Students	343	MEDICAL APPOINTMENTS: IMPORTANT NOTICE	356
ABSTRACTS FROM MEDICAL LITERATURE—		EDITORIAL NOTICES	356
Medicine	344		
BIBLIOGRAPHY OF SCIENTIFIC AND INDUSTRIAL REPORTS—			
The Results of War-Time Research	346		

THE INDIVIDUAL AND THE ENVIRONMENT.¹

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CALLED upon to address a medical gathering of diverse interests, an anatomist is exercised to discover in his professional stock-in-trade what is likely to hold the widest appeal. He is, however, only a biologist with a bias towards the human, and he can keep an eye on his fellow biologists. Thus he may glean some ideas of direct medical application, or at least gain better insight on man in the world of life. Unfortunately, keeping an eye on general biology is now beyond the scope of an individual, and I cannot claim to have found anything of immediate use to your work. In default, I have assembled a group of ideas which may provide a useful background to your daily dealings with the human animal. These ideas are best expressed by my title; but I must confess that its implications are wider than I first anticipated. For the individual may be anything from a virus particle to a human, while the environment is bounded only by the confines of the universe.

An individual living organism may briefly be defined as something which maintains itself at the expense of the environment at least long enough to reproduce its kind. Since the environment may vary, organisms must have adaptability to a range of conditions; further, all living matter is liable to the unpredictable changes called mutations. The environment includes such factors as heat, moisture, light and other radiant energy, chemical composition, nutrition, competitors and enemies and geographical surroundings. This is similar to Simpson's⁽²⁾

definition, but requires elaboration, for the conception of individuality extends to parasites of all kinds, to cells and even to tissues and organs, as we shall see. To all of these the *milieu interne* of the host is as much the environment as is the external world to the host. This applies, indeed, to any organism with a protoplasmic structure, and we must recognize an internal as well as an external environment.

Now while I intend to emphasize the importance of the environment, I do not wish to overstress it, because what the environment acts upon is at least equally important to the result. Nor shall I treat the environment after the semi-mystical fashion of Chalmers⁽³⁾ and of Whewell,⁽⁴⁾ and more recently of Henderson.⁽⁵⁾ With these writers we may agree that it seems uncommonly well disposed to the sort of life it supports, without admitting that this is more than a roundabout way of saying that life is extraordinarily well adjusted to the kind of world it found. Under different conditions an altogether different type of life might have evolved. The virtue lies not with the environment, but with the versatility of living matter, which secures such perfect exploitation of what facilities the environment affords.

The conception of hostile interaction between individual and environment must have impressed itself very early upon the mind of man, for the most primitive found need for an explanation by peopling the objects around with spirits—mostly malign—whose interference they thought determined the vicissitudes of man's journey through life. These spirits could be cajoled, placated, bribed, threatened or outwitted by those who claimed special familiarity with their ways. Thus arose religion and its ministers, and it seems fair comment that decay in religious belief runs parallel with increasing comprehension and control of environmental forces.

Philosophy, on the other hand—except in so far as it embraces metaphysics—seeks a rational system of ideas on man's relation to the environment. The most influential of the early Greeks thought to achieve this by reason

¹ Presidential address to the Section of Medical Science and National Health at a meeting of the Australian and New Zealand Association for the Advancement of Science, Perth, August, 1947.

alone; but such systems fail in the face of facts. Now philosophy depends ever more upon fact and limps rather lamely in the wake of science. Aristotle, who was also a biologist, was probably the first to give explicit recognition to our problem when he endowed the various bodily organs, and especially the heart, with innate urges, or entelechies, which determine specific structure and function in the face of environmental pressure. Erasistratus, an anatomist, held the contrary view that structure and function are imposed by external forces. Today, Aristotle would be considered a pure geneticist, Erasistratus a pure environmentalist; together they formulated the express antithesis which has come down the centuries since to its modern version of "nature and nurture".

Finally, brief consideration will show that science, too, is occupied with essentially the same problem. Conducted solely by man and—whether consciously or not—exclusively for his benefit, science is inevitably anthropocentric. Biologists trace man's rise, seek what living matter is of use to him, destroy what is harmful. Non-biologists explore the useful possibilities of the inorganic world and how to bring them under human control.

Religion, philosophy, science, each in its own way engaged upon the same problem—the riddle of man and the universe. This is an imposing thought, but I display it only momentarily, to show that our subject is worthy of pursuit. For I do not aspire to treat it upon so grand a scale, much less to offer a solution. Instead, I shall discuss only some of the simpler aspects of this topic as they seem to affect man and your dealings with him.

Individuality.

Our first problem is: what is an individual and how do you recognize it? That is, how much of what you see is genetic and inherent and how much due to the environment and more or less accidental? It is clear that for practical purposes the question has no meaning, for there is no such thing as an absolute individual or an absolute environment—only a resultant of the two. Nevertheless, there is strong belief in individuality, and this belief has good scientific justification. Therefore, if medicine or any other branch of applied biology is to gain effective control of the total situation, it must first determine the relative responsibilities of the two contributing factors. A few estimates of such responsibility in the human have been advanced: mental capacity as measured by the intelligence quotient may be from 60% to 80% hereditary, the rest environmental; stature may owe as much as 90% to heredity. But these are little more than inspired guesses. In this section I propose to sketch on a sufficient phylogenetic scale evidence for the fact of individuality.

Viruses, whatever their origin, represent the simplest living matter known to us. They comprise essentially nucleoprotein particles, of which the nucleic acid has a structure peculiarly adapted to union with protein (Astbury⁽⁶⁾) and a unique capacity for organic synthesis (Muller,⁽⁶⁾ Avery *et alii*⁽⁷⁾). Viruses betray their living nature in their life and reproduction, in their adaptability to diverse hosts and in their liability to mutation (Burnet⁽⁸⁾). The individuality of such minute particles is beyond our present assessment; but their specificity *en masse* is shown by constancy of size and properties through successive generations, and by specificity of host series and host response.

Accumulating evidence (Astbury,⁽⁶⁾ Muller⁽⁶⁾) suggests that unicellular organisms appeared when some nucleoprotein particles fashioned a permanent protoplasmic envelope. This was the major phase of organic evolution, for it required solution of all the problems of protoplasmic metabolism, and the metabolism of bacteria is essentially the same as in the highest multicellular organisms (Muller, Dubos⁽⁹⁾). At first the particles were scattered throughout the protoplasm, as is still the case with bacteria (Robinow⁽¹⁰⁾). Later, most became segregated within a special region recognized as the nucleus. Here, multiplication of the particles produced the genes, strung together on the spiral threads which are chromosomes; these, in turn, multiplied to a number characteristic for each kind of organism. Some particles probably remained extra-

nuclear—for example, the plastids (plastogenes) and plasmogenes in plant cells and possibly the κ substances and even Golgi apparatus and mitochondria in animal cells (see Muller, Astbury). All the particles have the virus-like capacity for living, multiplying and mutating, and are distributed to the daughter cells; but in animals generally only those within the nucleus are distributed with sufficient regularity to influence heredity. Muller suggests that the extranuclear particles achieve a symbiotic balance with the protoplasm and envisages the possibility that mutation in such "viroids", like the introduction of carcinogenic viruses, may initiate the unregulated cell division of malignant disease.

The living nature and specificity of bacteria are not in question. Wood *et alii*⁽¹¹⁾ have recently revealed the range of adaptability by "training" staphylococci to resist three thousand times the usual lethal dose of penicillin and "retraining" them back almost to the starting point. Morphological criteria are now available, too, but individuality still eludes us. Nucleated unicellular organisms, however, are often amenable to more precise observation (Loeb,⁽¹²⁾ White⁽¹³⁾) and for the first time evidence for individuality emerges. Loeb has collected much relevant information from mutual interactions and mating responses. He shows that even within a single species individuals may betray marked differences—and these become more pronounced the more distant is the relationship. The differences depend upon mutual incompatibilities, which Loeb calls "organismal differentials". They have a chemical basis, are genetically determined and vary in intensity from group to group. Adverse environmental conditions depress the differentials: incompatible cells can then come together and this may be the basis of a form of "sexual" conjugation. Such depression probably accounts for attenuation of the virulence of viruses and bacteria living under unsuitable conditions.

Multicellular organisms arose when unicellular differentials were sufficiently depressed to permit aggregation in permanent cell masses. This was foreshadowed in unicellular organisms, and Loeb has succeeded in synthesizing "pseudo-tissues" by exposing normally independent cells—for example, the amoebocytes of *Limulus*—to unfavourable conditions. Such aggregates could be manipulated like ordinary tissues. The material by which cells adhere is a polysaccharide—hyaluronic acid; production of a protective coat of polysaccharide is a common cellular response—for example, in the capsule of virulent bacteria and in the cellulose of plants and ascidians. The story is now of increasing differentiation and specialization. Nevertheless, it is possible that all cells can be reduced to three basic types (Willmer⁽¹⁴⁾) or even to one (Loeb, Willmer), and that location—that is, environment—plays a part in differentiation (Willmer).

Loeb and others have tested differentials by autogenous and heterogenous grafting of benign and malignant tissues, by animal parabiosis and by vascular anastomosis. The picture is complicated by different tissue reactions. Thyroid, fat and cartilage are less provocative than striped muscle, epidermis and ovary, while the brain, the testis and the anterior chamber of the eye are more tolerant than peritoneum and the subcutaneous tissues. The intensity of reaction is measured by increase of such cells as fibroblasts, lymphocytes and polymorphonuclear leucocytes. (We must note that while Loeb considers this response defensive, Ludford⁽¹⁵⁾ believes that it fosters malignant invasion anyway.) Tissues reveal their specificity by constancy through serial culture, as do malignant cells (Willmer, Parker⁽¹⁶⁾). These can be "trained" to invade unnatural hosts; or their activity can be reduced, as can that of the host, by exposure to such agents as heat and ultra-violet light.

Thus we must recognize tissue differentials as well as organismal differentials. There seems to be no constant correlation between tissue differential and grade of specialization; but organismal differential shows a definitely progressive intensity on the evolutionary scale as well as during individual development. However, in some animal groups differences can still be shown even between litter mates of a long inbred strain. It should be

emphasized that these are not immunity responses. Such take time to develop, are specific for particular antigens and can be selectively suppressed by blocking the reticulo-endothelial system with colloidal particles *et cetera*. Moreover, antibodies can be transferred effectively to other animals, as in passive immunization, but parabiosis and vascular anastomosis indicate that this is not possible with the differentials.

We may pause to consider some practical application of these findings. In the first place it is clear that spontaneous cancers are in the nature of autogenous grafts and will neither antagonize the differentials nor evoke immunity reactions; also, it seems likely that further investigation of tissue differentials would elucidate some of the vagaries of malignant metastasis. The high differentials of epidermis and subcutaneous tissue are displayed in the known superiority of autogenous over heterogenous skin grafts. On the other hand, corneal transplants are necessarily heterogenous, and it is fortunate that the anterior chamber of the eye is so tolerant. Experimentally, Le Gros Clark⁽¹⁷⁾ and Glees⁽¹⁸⁾ have cultured embryonic nervous tissue in the tolerant brain, and Markee⁽¹⁹⁾ has watched menstrual changes in endometrium implanted in the anterior chamber of the monkey's eye.

Immunity phenomena also come within our scope, for apart from those acquired by "training" there is a type which is genetically inherent—the ordinary blood group reactions (Wiener⁽²⁰⁾). Agglutinogens appear in the red cells early in fetal life, agglutinins develop in the serum after birth; both approach maximum intensity towards maturity. When all the possible combinations and permutations of the known agglutinogens—A, A₂, B, M, N, the P group and the members of the Rh group (Wiener *et alii*,⁽²¹⁾ Graydon and Simmons⁽²²⁾), together with those still being discovered, are taken into account, the prospect of identifying any blood as an entity as specific as the fingerprints seems well within sight of attainment. Blood group individuality, like differential individuality, shows progressive intensification both phylogenetically and ontogenetically and, as far as the blood is concerned, the acme appears to be in man.

To all this we can add the growth of a mental concept of individuality—appreciation of the ego as distinct from the external world. Such a concept seems to be related to the granular prefrontal cortex, in which, as Le Gros Clark⁽²³⁾ and Walker⁽²⁴⁾ have shown, is the possible synthesis of all the elements of which the ego is composed. Thus the most characteristic immediate result of prefrontal leucotomy is disturbance of the ego-environment balance as shown by loss of both insight and foresight. Simple mammals lack a prefrontal cortex. Thereafter comes progressive expansion up to man (Brodmann⁽²⁵⁾), and man appears to have the greatest ego development.

All these criteria of individuality have been expressed in terms of environment, and this may expose me to a charge of arguing in a circle. So I may adduce evidence of a different kind. In the first place the fingerprints are individually specific, genetically determined and unaffected by environment. Also, Murray⁽²⁶⁾ has cultured *in vitro* the mesenchymatous *Anlage* of the femur of a chick embryo. The result was an undoubted femur, similar to that which develops normally in the chick. We may conclude, then, that there is evidence from several sources to support the idea of individuality, and that individuality shows a definite evolution to a maximum, probably, in man.

Nature and Nurture.

Here I wish to consider some of the changes which environmental factors may effect in the overt expression of the genetic make-up. We must start with the genes themselves, for the many thousands in any cell form a self-contained community which sets up its own definite environment. Further, each gene probably has an individual influence over its neighbours in proportion to their proximity.

The genetic constitution itself is subject to change, and this determines the variability upon which evolution depends. Three types of mutation are described. Genome

mutations are due to alteration—usually by doubling—of the number of chromosomes. Chromosomal mutations depend upon structural changes in the chromosomes which disturb the interrelationship of existing genes. Gene mutations are produced by changes—probably chemical—in the individual genes (see White,⁽²⁷⁾ Huxley⁽²⁷⁾). The first two types have been observed directly; the third is beyond that, but its frequency can be measured, its locus can often be computed and the observed results may be quite striking. Mutations are considered spontaneous. However, their frequency can be increased by exposure to various agents—some chemical, many physical (see McAulay and Ford⁽²⁸⁾), such as heat, ultra-violet light, X and γ rays and cosmic rays. The constant presence of many of these agents in the normal environment raises the suspicion that they are really the cause of the "spontaneous" mutations. It is clear, anyway, that some geographical regions favour change more than do others—a view which has palaeontological support (Simpson⁽²⁹⁾).

Any mutation is born into a genetic community which has survived sons of change and is happily adjusted to its economic niche. Mutations are at random, and while a minority may promise benefit and some are neutral, it is unlikely that the vast majority would prove other than harmful under existing conditions. Now it seems—in the case of gene mutations, anyway—that the genetic democracy may exercise a sort of censorship, which forces into more or less recessiveness anything that threatens harm or too great departure from the established path of safety. Such recessives are carried as unsuspected passengers until by chance they mate with similar partners. Thus albinism, which occurs in about one in 20,000 of the population, must be carried as a recessive by one in every 70 persons (Hogben⁽³⁰⁾). Indeed, Muller estimates that every individual carries at least one recessive that would prove lethal in the homozygous condition. In small communities the mutation rate is balanced by elimination of the homozygotes (Haldane⁽³¹⁾); but such equilibrium is not attained in large communities.

An interesting case of the genetic environment is seen in sex determination. The common urge of all the autosomal genes is towards the fullest possible differentiation of the characters for which they are responsible. Of the two sex chromosomes, the Y in mammals is probably neutral and may be absent, but the X is a suppressor. One X has little effect and a male results; but two X's arrest differentiation and a female results. This is evident in the shorter period of female growth and retention of juvenile skeletal characters, in the earlier onset and cessation of reproductive activity, and in the external genitalia, which represent an arrested stage of the male.

Characters which survive the genetic censorship are still subject to the external environment, and some results seem quite arbitrary. Such are temperature effects on the coloration of primroses, pigmentation of Himalayan rabbits and Siamese cats, and sacral hypoplasia in some fowls, and the effect of moisture on abdominal deformity in some kinds of *Drosophila* (Huxley,⁽²⁷⁾ Hogben,⁽³⁰⁾ Haldane⁽³¹⁾ and others). Even when characters seem constant throughout the usual environmental range, some qualification is necessary. Thus, although the ordinary blood agglutinins maintain their activity up to the normal body temperature of some 37° C., they are progressively more inactivated as the temperature rises to 55° C. (Wiener), and this is only a special case of the "cold" agglutinins which are inactivated at body temperature (this last includes, fortunately, the autohaemagglutinins described by Forbes⁽³²⁾). Albinism should depend only upon concurrence of the two appropriate recessives; lately, Hill⁽³³⁾ has shown that its uncommonly high incidence in diverse animal groups in Ceylon suggests an environmental factor as well. Rather more subtle is the case of haemophilia. The classical form affects only males because of a recessive on the single X chromosome. However, some females are known to possess the recessive on both their X chromosomes; since the double dose is not lethal they should be haemophilic, but they are not. This suggests that their hormonal environment suppresses the

condition, and success has been claimed for treatment of hemophilic males with ovarian transplants and extracts (Hogben). The production of mongolism should be considered here, too, but I shall defer it for the next section.

More striking environmental effects have been reported. Berry and Dedrick⁽⁴⁴⁾ transformed the virus of rabbit fibroma into that of infectious myxomatosis, and Avery *et alii*⁽⁴⁵⁾ converted the avirulent unencapsulated *R. pneumococcus* into the virulent encapsulated *S* form (the agent was a nucleic acid). But these may be instances of the chemical production of mutation.

Apart from arbitrary changes, organisms can also vary in obvious response to environmental demands. Such adaptability, being reversible, is more favourable to success than is fixed mutation perpetuated by natural selection. The evidence for adaptability is so overwhelming (see, for example, Huxley⁽⁴⁷⁾) that I can give only a few examples. Most familiar is the annual change in coloration of Arctic birds and mammals; closer to us is the extraordinary modification in life and breeding habits of frogs that have invaded the dry centre of Australia (Baldwin Spencer⁽⁴⁸⁾). And that engaging naturalist Ivan Sanderson⁽⁴⁹⁾ gives some striking instances among lizards and rats in Central and South America. I may conclude by drawing attention to the extensive range of adaptability which has allowed man to adjust himself to almost every environmental niche available.

Enough has been said to illustrate the influence of the environment on the manifestation of genetic characters. It will be of interest to see some of the results in human development.

Nature and Nurture in Human Development.

At the outset we must appreciate that this story has neither beginning nor end. It began with life itself and will stop only when life is no more. The individual is but an event in time—temporary custodian of an endless living stream, and any attempt to consider him otherwise is to forget all that has gone before and to ignore all the possibilities of the future.

Even before conception we meet the environmental factor, for in many mammals, including man, sperms mature only at the lower temperature of the scrotum; further, penetration of the cervix depends not only upon their quality, but also upon that of the cervical mucus (Barton and Wiesner⁽⁵⁰⁾) and probably upon vaginal acidity, too (Bourne and Williams⁽⁵¹⁾). The next problem arises when sperms meet an ovum in the Fallopian tube. The ovum still has its *corona radiata* of follicular cells bound by hyaluronic acid. Invading sperms, like invading bacteria (see Haas⁽⁵²⁾), secrete hyaluronidase to destroy the barrier; and there must be sufficient good quality sperms to produce enough hyaluronidase to clear a way to the ovum. After fertilization the ovum creates an environment unfavourable to other sperms; but chemical changes may upset the mechanism and polyspermy result, with deformity and abortion (Rostand,⁽⁴⁶⁾ Corner⁽⁴¹⁾). Or concurrence of lethal or sublethal genes may determine early destruction or future malformation—conditions to which the tubal environment may contribute.

Mammals are peculiarly favoured by development in the constant uterine environment; but even here things may go awry. The embryonic cells are now subject to a new environmental factor in the organizers—chemicals which determine differentiation, both general and local (see Child,⁽⁴³⁾ Huxley and de Beer⁽⁴⁵⁾). Their major work is in the first three months, and it is during this period that genetic and extraneous factors wreak the greatest havoc. An outstanding example is the effect of the German measles virus, to which Gregg⁽⁴⁴⁾ first drew attention. And the uterus is not without blame either. In the first place it may resist implantation at all. Apart from this, as Bland-Sutton⁽⁴⁵⁾ and others have stressed, invasion by an embryo is akin to invasion by a malignant tumour. The uterus has its decidual response; but the balance between invasion and defence may swing one or other way, with risk to either mother or embryo. The genetic constitution probably contributes much to the production of abnormalities; but since most of those seen in the human have

been duplicated experimentally, it is probable that the uterus contributes too. As Corner⁽⁴¹⁾ points out, a good egg in a bad uterus may have the same outcome as a bad egg in a good uterus. Still⁽⁴⁶⁾ has drawn attention to the high proportion of abortions, stillbirths and abnormalities associated with first pregnancies—not as such, but first pregnancies in the unfavourable uteri of women over the average age for primiparity. He confirmed previous observations that mongolism is most frequent in late pregnancies; but there is a secondary peak in first pregnancies of mothers with an average age of thirty-three years. Penrose⁽⁴⁷⁾ showed that mongolism may occur in only one of fraternal twins, that it rarely occurs twice to the same mother, that mothers of mongols are frequently related, and that mongolism has a high association with other abnormality; he concludes that mongolism is probably due to a sublethal gene which can manifest itself only in an unfavourable uterine environment. A further example of the uterine influence is seen in the differential fetal mortality according to sex. Males are more vulnerable than females, probably because of their single X chromosome, and are more susceptible to what may seem relatively minor environmental disabilities. To compensate, male conceptions exceed female by 10% or more, but by the time of delivery the lead has dropped to 5%. We may agree, then, that Corner's estimate—that one-third of all conceptions are lost, mostly in the first few weeks, before the mother even knows she is pregnant—is probably not excessive.

At the end of pregnancy the foetus must be delivered and the question of relative size arises. As an extreme example, crosses have been effected in both directions between the Shetland pony and the Shire horse. In both cases the adult offspring is about intermediate in size; but at birth that born of the Shetland mare is of Shetland size, that of the Shire mare is of Shire size. Such extremes are not seen in man, and I know of no systematic observations on relative parent-baby dimensions. But since the vast majority of confinements proceed normally—even those of women very dissimilar to their husbands—we must conclude that the maternal environment probably secures some prenatal adjustment of foetal size.

I must restrict myself to only a few examples of environmental influence after birth. The effect of nutrition on stature, resistance to disease, and possibly mental development seems well established by the work of Corry Mann⁽⁴⁸⁾ and others (see Abbie⁽⁴⁹⁾), although Paton and Findlay⁽⁵⁰⁾ feel that environmental factors are overstressed. The influence of sex has already been considered; here it remains to add that gonadal deficiency delays epiphyseal union, and in the female particularly leads to excessive growth of the inferior extremities. Also the form of the female pelvis seems to depend upon environmental factors; at least, the form most favourable to parturition—round or elongated antero-posteriorly, not transversely oval (Thoms,⁽⁵¹⁾ Kenny⁽⁵²⁾)—occurs most frequently in women of superior economic status (Greulich and Thoms,⁽⁵³⁾ Kenny). The influence of epidemic disease upon the fate of nations has received frequent comment, and Rogers⁽⁵⁴⁾ has drawn attention to the effect of climate upon the incidence of disease; in the reverse direction native peoples have shown striking physical and mental improvement when freed from their diseases and parasites (Le Gros Clark⁽⁵⁵⁾). I have already referred to the vulnerability of the male: the 5% excess at birth is reduced to parity by the normal mating age of twenty years; thereafter the male falls off progressively until by eighty years he has only half the numbers of the female. As a corollary, female children survive better and are more numerous in poor surroundings.

Finally comes the problem of malignant disease. Since this does not arouse the normal body defences, the main protection against unregulated growth must be the ordinary regulating mechanism—the organizers already discussed. But these are wasting assets; their major job is done by the third foetal month, and after cessation of growth at twenty years or so they do little more than control reparative processes. As repair wanes with advancing years the incidence of malignancy rises. Now there is a struggle between cells stimulated by some agent

to multiply unduly and the residual organizer control. There must be some such struggle throughout life; but as the organizer potential falls the local tissues may get out of hand.

The importance of the physical environment is apparent enough, even from this brief survey. Now it is time to consider man's mental environment.

The Civilized Environment.

The environment does not remain unaffected by the living organisms it supports. Each produces some change which, in the case of such as the bees and ants, may extend to a notable degree of real control.

Man has inhabited this earth for perhaps a million years, a mere fraction of the thousand million or so for the whole of life. During the greater part of his time he has lived like all other animals, for it was less than ten thousand years ago that neolithic man first established fixed settlements with a mainly agricultural economy. Such as it was, civilization began then, and since that time man's control of the environment has advanced at an ever-increasing tempo, such that the last two hundred years have seen more change than all the millennia before. These technical attainments, which may justly be attributed almost exclusively to western European civilization, are reflected in man's material comforts and in his improved health, physique and expectation of life. Why, then, should the very people who achieved this astounding success now be facing biological failure?

The work of Enid Charles⁽⁶⁶⁾ and others shows that continuance of present reproductive trends will lead to serious diminution of the white peoples in the next half-century. Moreover, improved longevity threatens a population topheavy from excess of the aged and unproductive. Further, according to Burt,⁽⁶⁷⁾ the fall affects mainly the more intelligent, so that, even when allowance is made for the untapped mental resources to which Gray and Moshinsky⁽⁶⁸⁾ refer, a drop in average intelligence also appears inevitable. The reason for all this seems mainly biological.

Palaeontology shows that there has been little change in human cranial capacity since the Swanscombe skull of possibly a hundred thousand years ago. And observations on modern man give no reason to suppose that he is more independent of the universal urges to self-preservation and reproduction than other members of the animal kingdom (Abbie⁽⁶⁹⁾). Against the fact that man remains bound to Nature must be set the fact that his technical achievements have introduced into life a complexity for which Nature has made not the slightest provision. For this complexity has been imposed by an intellectual few upon the apathetic and reluctant multitude. A virtually palaeolithic mind, hampered by exaction of the obligations of a long-dead past, is expected not only to cope with all this, but to maintain a normal reproductive output as well.

This is asking too much. Civilized man is fully occupied with the new struggle for existence; self-preservation comes first and the gratuitous burdens of family are rejected—civilization helping with means for sexual satisfaction without responsibility. The falling birthrate is both reaction and protest. The fall cannot be related constantly to any single factor (Glass⁽⁶⁰⁾); the most potent causes are economic—that is, environmental—and it is clear that the environment stands indicted as a whole. Further, as Darwin knew, and as Sherrington⁽⁶¹⁾ and Keith⁽⁶²⁾ have lately emphasized, the standards upon which civilization depends are diametrically opposed to those which determine biological success. Now civilization exercises a rigorous selection towards a mental robustness which can withstand these conflicting urges; the failures go to the kinder atmosphere of hospital or asylum, or retreat to a haven of alcohol, drugs or Hollywood. It is impossible to escape the conclusion that in his civilization man has created his own most formidable competitor for existence. And what befalls western civilization today will surely befall its heirs, until the human intellect vastly exceeds its present capacity.

One grain of comfort remains: all forecasts are based on the assumption that existing conditions will continue

so. Kuczynski⁽⁶³⁾ has given the views of some pioneer English demographers of the century 1660 to 1760. They, too, deplored the falling birthrate, which threatened England's future, and the reasons they alleged—low marriage rate, immorality, alcoholism and abortion—were probably on a par with similar complaints today. Within forty years Malthus published his famous essay to give warning that the rapidly expanding population would soon outgrow its food resources. The two views are opposed and both were wrong, for neither could take into account the impending industrial revolution, with its astonishing increase in both population and food resources. So it is today. A new source of power could magnify the few to a force before which mere numbers pale, or better health of the aged may render increase redundant. Alternatively, changed political outlook could reverse the present trend, or reproduction may become an industry divorced from sexual satisfaction—as in Aldous Huxley's "Brave New World". But the greatest hope seems to lie with the future unfolding of man.

Man's Future.

Any ideas on man's future must necessarily be tentative; but the fact that changes seen in the past continue today encourages the view that they will extend into the future. The major physical changes are progressive rise in stature (Le Gros Clark⁽⁶⁴⁾) and progressive shortening of the skull (Weidenreich⁽⁶⁵⁾). Increasing size marks any successful animal group, and it continues, for the average modern stature is two inches over that of only thirty years ago.⁽⁶⁶⁾ Skull shortening has proceeded right up to today. It has been accompanied by loss of eyebrow and occipital ridges, shortening of the jaws, thinning of the bones and delay in suture closure—to different degrees in different peoples. Bolk⁽⁶⁷⁾ showed that these changes indicate retention of fetal characters into adult life. He called the process "fœtalization"—this is now considered a special case of the broader zoological conception of neoteny (de Beer⁽⁶⁸⁾).

The changes seem partly dependent on the environment. The effect of nutrition on growth has already been noted; now it appears that skull form may also change with changed conditions. Boas⁽⁶⁹⁾ showed this in the first generation born to immigrants to America: long-headed people had descendants with shorter heads, but the very short-headed had longer-headed descendants. They all tend to converge upon a mean universally characteristic of the human fœtus (Abbie⁽⁷⁰⁾). In other words, both very long and very short skulls are specializations away from the fetal norm, to which they may revert under favourable conditions. Early man, then, was not physically primitive for all the features in which he approximates to the ape are what Wood Jones⁽⁷¹⁾ calls "pithecoïd specializations".

Fœtalization may be visualized as a sort of race between bodily differentiation and the onset of sexual maturity. The longer differentiation is protracted the less complete will it be when maturity calls a halt. In man this process already raises some practical problems for, as Trotter⁽⁷²⁾ pointed out, the thin skull of the European has a surgical significance different from the thicker skull of, say, the Negro; further, the third molars are getting less and less opportunity to appear, and progressive limitation of jaw size leads to dental overcrowding. If maturation time remains constant, simple continuance of this process will eliminate more and more structures from the adult end of the scale and enhance progressively juvenile, or even fœtal, characters. An extreme is seen in the axolotl, which attains sexual maturity at the normal time, but without undergoing metamorphosis into the adult *Amblystoma*; the human equivalent would be a full-time fœtus of adult size entering upon active reproduction at the age of twenty or so.

But there is evidence, further, that in man the time of onset of maturity is itself being delayed. Judged by dental development, the monkey is adult at seven years, the chimpanzee at ten years (Schultz⁽⁷³⁾), ancient man was adult before modern man (Weidenreich⁽⁷⁴⁾), and modern native peoples are adult before white man (Campbell⁽⁷⁵⁾). Thus white man has not attained in twenty years what the native has in, say, eighteen, early man still younger, the

chimpanzee at ten, and the monkey at seven. And throughout there is progressive decline in differentiation as well. It is of interest that white man, who exerts the greatest environmental control, shows the extreme of this trend. At all events, there is reasonable evidence for both fetalization and deferment of maturity. Here lies man's greatest hope, for extension of the developmental period promises the appearance of incalculable novelties, particularly in the way of cerebral expansion. And even left to itself this prolongation of youth should lead to prolongation of life as a whole—one day, perhaps, indefinitely.

I suspect, however, that the process will not be left to itself, that sooner or later man will learn how to accelerate the change which is now so slow. Environmental control—yet in its infancy—has already produced impressive results, and it seems no overstatement to say that the simple conception of an antiseptic environment—in general hygiene and sanitation as well as in the hospital—has done more for man than all the drugs that have been poured down his neck since he first appeared on earth. But this is only the external environment, for which tremendous possibilities remain; the internal environment remains virtually untouched. I feel that recent work indicates that effective control of man's internal environment is within the bounds of technical possibility. There can be little doubt that such control will aim to anticipate Nature's trend to an age of unlimited youth.

The prospect is less attractive than it seems. We live now in a world wholly dominated by the inevitability of death, and even minor extension of old age promises serious difficulties. Potential immortality would bring problems beyond the contemporary human mind; with our present outlook life would become perpetual fear of premature dissolution, and all the heroism by which man climbs to greatness would be lost. Powell⁽⁷⁰⁾ has pointed out that the immortal gods the Greeks conceived were lesser than their creators, for with all human virtue and vice, they yet could not make the supremely human sacrifice of life itself. Potentially immortal, modern man would be an even lesser thing. The time for such knowledge is not yet, and we must hope that it is not, like atomic power, thrust untimely upon an immature world.

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THE HYPOTHALAMUS AND OBESITY.¹

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THERE are height: weight ratios which we accept as normal. When food intake falls below the level required to meet energy output, leanness results and an individual becomes "underweight". If a failure of the opposite nature occurs and food intake exceeds the normal requirement for activity and heat production, this extra fuel either is not assimilated or is crammed into storage depots. An excess of protein intake is always balanced by an augmented nitrogen excretion, because protein cannot be stored as such in the body to any degree. Excess sugar intake may cause some spilling over into the urine; but the body has almost unlimited capacity for storing fat and carbohydrate as fat. An excess food intake invariably results in a gain of weight.

The remarkable thing about the mechanisms which balance the energy input and output is not that the adjustments are sometimes imperfect and some are under weight while others are too pudgy, but that the regulation is so perfect that many individuals do not vary in weight by more than a pound or two during periods as long as forty years or longer, even though their level of activity and energy requirement periodically may have varied enormously.

What is the nature of this mechanism which normally prevents extremes of leanness or of obesity by so neatly balancing the food intake to the energy output? Since my topic is obesity, it might be better to state the question in this way: What is the nature of the abnormalities or imbalances which result in obesity?

Obesity.

Obesity is an abnormal condition caused by excess storage of potentially energy-producing substance in the form of adipose tissue.⁽²⁾

The food-storing capacity of the body can be described as follows. Proteins are not stored to any extent, although plasmaphoresis experiments have shown that the body normally has several grammes of plasma proteins available for resupplying the blood after hæmorrhage. In starvation the circulating proteins are lost first, and muscle protein is broken down only secondarily. The maximum gain in weight from storage of excess proteins is only a few grammes—that has led to the idea of high protein diets in reducing experiments; but one must remember that 58% of protein can be converted to carbohydrate, then to fat.

Carbohydrate storage by inundation and in the form of glycogen, likewise, cannot add much weight, because the carbohydrate store of the body after liberal feeding is only

300 to 400 grammes. Excess carbohydrate, like excess protein intake, can lead to significant weight gain by conversion to fat.⁽¹⁾⁽³⁾

The ability to store food as fat is a property common to all animal organisms. It is the ideal energy storage medium, because one gramme contains or can yield nine Calories on being burned. Certain tissues possess a special ability to form and store this material. Good examples of "regional lipophilia" are furnished by the "fat organ" of hibernating animals, by the hump tissues of the camel tribe, and by fat-storing tails of that peculiar fat-tail Syrian variety of sheep of which the tails become so enormously engorged with fat that, I am told, they must be supported on little carts which the animals drag about while grazing. Some general storage of fat in the human body is essential to certain mechanical protective functions. As obesity develops, these foci are expanded and other potential storage regions are occupied. Certain tissues, however, have greater ability to form fat than do others. The abdominal skin accumulates fat more readily than does the skin of the back of the hand. Brauer reports an interesting case in which a bit of abdominal skin was used in a skin graft on the hand. Some years later the individual began to develop obesity and was displeased to observe that the skin of the graft accumulated a disproportionately large mass of fat. In obesity the extra weight is practically entirely that of excess fat.⁽¹⁾⁽⁴⁾

Obesity is a serious disease. Vital statistics have shown that individuals who are overweight have a much shorter survival expectancy.⁽⁵⁾ For example, life insurance studies by Dublin and Lotka (1936),⁽⁶⁾ in which they analysed the influence of weight on duration of life of 192,304 men, aged twenty-one years or over, showed that "the penalty of overweight is one-fourth to three-fourths excess in mortality". Excess weight carries a much more serious risk in persons beyond forty-five years of age.

TABLE I.
Influence of Overweight on Mortality in Persons 45-50.

Pounds Overweight.	Increase in Death Rate over Average.
10	8%
20	18%
30	28%
40	45%
50	56%
60	67%
70	81%
90	116%

The extra weight and size of the individual overtax the cardio-vascular system. This is the common cause of the early demise. Obesity also may cause other serious deficiencies such as sterility.⁽¹¹⁾ According to information given in a recent burst of newspaper publicity of a committee formed in England to consider ways and means of prolonging human life, American workers have shown that rats held on a limited food intake live twice as long as normal. The facts of the case are these: Extensive experiments have been carried out in two good American nutrition laboratories. Results have shown that rats on restricted food intake show less fatty degeneration of organs, less tumour development and fewer fatal respiratory infections developing early in life.⁽¹²⁾⁽¹⁷⁾ Less limited control animals die of these disorders early or more particularly about the middle of life, which reduces average life expectancy. However, in one series the same number of control and limited animals were alive at the end of the experiment (108 weeks)⁽¹⁷⁾ In another series⁽¹³⁾ a few "restricted" rats survived longer than did the oldest controls, and the oldest "restricted" (1400 days) rat out-lived the oldest control (1150 days) by 250 days or 25%. Restricted diets do improve life expectancy slightly, but this is under controlled conditions.

Things I have heard concerning the lowered resistance of starved individuals indicate pretty clearly that neither starvation nor obesity prolongs life expectancy.

¹ A post-graduate lecture delivered under the auspices of the Australian Post-Graduate Federation in Medicine.

Gradation of Obesity.

Maximum obesity is quite uncommon; but all grades occur and lesser degrees are common.⁽²³⁾ The largest and the most obese man on record was Miles Darden, who died in Tennessee in 1872. His maximum weight was 1021 pounds. He was not only obese, but was also of unusual stature, being seven feet five inches in height. Mrs. Ruth G. Pontico seems to hold the woman's record. In order to estimate the magnitude of obesity, one needs more than a weight figure. Usually a height or length-girth comparison is employed. When girth exceeds length, then it is safe to say that obesity exists. On the basis of such comparisons Mrs. Pontico, because of her short stature, should be considered more obese than Mr. Darden, even though her peak weight was only 887 pounds. Mrs. Pontico's parents were circus people, the fat lady and the strong man. She earned her living as a circus fat lady too. At the age of twelve years she weighed 235 pounds. She died in 1937 of cardio-vascular failure during the course of a minor operation at the age of thirty-five years. There are numerous cases on record of individuals weighing 750 pounds or more. The basic cause of obesity in these individuals is not known; but after they had obtained a conspicuous degree of obesity their accomplishment became a source of pride and livelihood, and a gain in weight was striven for. However, Mrs. Pontico's diet as reported in the literature did not seem strikingly excessive. It is much easier to gain weight than to lose it, and after obesity is attained it can be maintained on a surprisingly low caloric diet.⁽²⁴⁾

Obesity may result from any one of several different causes. A very marked degree of obesity can be produced experimentally by injury to the hypothalamus. In recent studies of obesity such preparations have been employed; but the finding may not necessarily apply to obesities of other origin.

Experimental Production of Obesity.

The hypothalamus is a small area of the forebrain lying beneath the thalamus, above the hypophysis or pituitary body. It extends from the region of the optic chiasm to the mesencephalon. It is similar in all mammals. Functions have been assigned to several of the cell groups which it contains. The nuclei involved in the obesity-producing lesions are the ventromedian nuclei. Tumours in this region are known to be associated with obesity in the human being.⁽²⁵⁾ In cats, rats, monkeys and dogs obesity has been produced by lesions so localized that they injured little more than these two nuclei (right and left ventromedian nuclei). These injuries have been produced electrostatically by means of fine electrodes manipulated by a Horsley-Clarke stereotactic apparatus. The injury must be bilateral to be effective. Since nuclei have afferent connexions and motor pathways through which their cells act, it is not surprising that lesions outside the confines of this area are sometimes effective. Lesions placed progressively distally and centrally from the ventromedian nuclei have likewise been found by Hetherington to be effective—they possibly interrupt a descending pathway. Such ventromedian nucleus lesions produce obesity of the magnitude of a 100% to 400% weight gain.⁽²⁶⁾

Phases of Obesity.

Growth curves reveal that obesity has two phases: (i) a dynamic phase, during which a rapid weight gain occurs, and (ii) a static phase, during which there may be fluctuations but no progressive change—this is a period of weight maintenance.⁽²⁷⁾ It is obvious that the best period in which to search for the abnormalities producing obesity is the dynamic period of weight gain, before the static phase develops in which a balance is re-established. Some of the contradictory conclusions in the literature are due to the fact that the studies were made during different phases of obesity. The experimentalist can study both phases.⁽²⁸⁾ The associated abnormalities depend upon the extent of the hypothalamic lesion (Figure 1). What results have been obtained in recent studies?

Causes of Obesity.

Obesity is not an endocrine abnormality phenomenon.⁽²⁹⁾ It can be produced in the presence or in the absence of the hypophysis, adrenals, thyroid, gonads and islets of Langerhans.⁽³⁰⁾ Hypothyroidism and hypogonadism may contribute to the establishment of a low grade of fat deposition—may contribute to other obesity-producing tendencies. The endocrine glands determine where fat is deposited normally. Obese individuals possessing certain endocrine abnormalities are likely to exhibit a fairly characteristically peculiar distribution of fat. The steroid hormones are almost invariably involved in such peculiarities of deposition.⁽³¹⁾

There is no evidence of either a more rapid or a more effective digestive process. The rate of carmine passage through the gastro-intestinal tract and the food-faeces weight ratios are normal.⁽³²⁾ Chemical analysis of the combustible materials in food and faeces have shown that in three obese individuals coefficient of utilization was 87%, 84% and 83% respectively while in three controls it was essentially the same—88%, 86%, 89%.

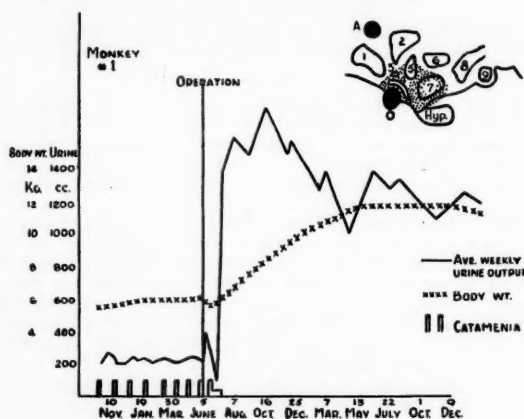


FIGURE 1.
The static and dynamic phase of obesity in a monkey as indicated by weight curve. The associated abnormalities of the sex cycle and water balance are due to the extent of the lesion to nuclei other than the ventromedian (V.M.). Lesion stippled. Hyp.: hypophysis; A: anterior commissure; O: optic chiasm; 1: medial preoptic nucleus; 2: paraventricular nucleus; 3: suprachiasmatic nucleus; 4: supraoptic nucleus; 5: anterior hypothalamic nucleus; 6: dorsomedial nucleus; 7: ventromedian nucleus; 8: posterior hypothalamic nucleus; 9: medial mammillary nucleus.

Food self-selection or preference tests have revealed no peculiar dietary tendencies during the dynamic phase of obesity. Rats have no abnormal preferences for fat or carbohydrate—they merely select quite a bit more of everything.⁽³³⁾

There is an exaggeration of fat formation and storage. This, however, may be a secondary rather than a causative phenomenon. The nature of the abnormality is as follows. As you know, some idea of the type of food being burned by the body can be obtained by relating the quantity of oxygen used to the quantity of carbon dioxide liberated, because the molecules of the three different types of foodstuffs (carbohydrate, fat and protein) characteristically require different amounts of oxygen and give off different amounts of carbon dioxide in burning.

The respiratory quotient ($\frac{\text{volume of carbon dioxide}}{\text{volume of oxygen}}$) of carbohydrate is 1.0, of fat it is 0.7, of protein it is 0.80. The theoretical respiratory quotient of a transfer of carbohydrate to fat is a respiratory quotient of above unity (1.2 to 2.0). We know that carbohydrate can be converted to fat, because animals easily fattened such as pigs store more fat than is provided by the fat and

protein eaten. Furthermore, milk cows yield more fat in their milk than can be accounted for by the protein and fat in their food. Under these conditions of excessive conversion to fat the respiratory quotient is greater than 1.0.

When a normal animal is given glucose either intravenously or by mouth, its respiratory quotient may rise from about 0.78 to 0.85 or 0.90. If animals are compelled to form much of their required fat from carbohydrate, by being kept on a low-fat, high-carbohydrate diet, they show a respiratory quotient of 1.5 to 2.0 whenever a test meal of glucose is given—showing an emphasis on fat production.

During the dynamic phase of obesity the post-prandial respiratory quotient exceeds 1.0, as though there is an unusual emphasis on fat formation from the carbohydrate of the diet. This peculiarity appears within a few days after hypothalamic injury. Glucose given by mouth or injected intravenously likewise causes the respiratory quotient to rise above unity. Pure fats do not elicit the change. A considerable volume of carbohydrate must be given in a test meal to produce sufficient fat formation to dominate the respiratory quotient picture. In order to get this much carbohydrate from a protein meal by protein conversion to carbohydrate, such large quantities of solids or amino acids were required that symptoms of toxicity developed and the experiment was vitiated. This tendency to shunt food into fat storage may be due to a constantly filled carbohydrate storage and an overflow into fat depots. The peculiarity gradually disappears as the static phase of obesity is established and less new fat formation is occurring.⁽⁹⁾

Can obesity develop on a normal food intake? Many fat people claim that they eat no more than their normally thin associates and no more than they formerly ate, before obesity began to develop. The chief difficulties confronting one who wishes to answer this question are those involved in determining what is a normal intake and in determining how much the test subject actually eats. The problem was attacked as follows:

1. Paired feeding experiments: The potentially obese animal is given for its Tuesday ration the amount of food a littermate ate on Monday, *et cetera*. This technique has the defect that littermates are not identical and behaviour differences *et cetera* may be important.

2. Self-comparison experiments: An animal's food intake is determined over a long period. After operation the pre-operative average daily food intake is given. The defect of this technique is that, when young, animals are more active and have a higher average food intake per unit of body weight than when older.

In a high proportion of such experiments undertaken, no matter how the norm was determined, the animals with lesions outgained their controls and formed more adipose tissue.

Normal and potentially obese rats and monkeys have quite different eating habits. Normal monkeys play around with their food making indescribable messes of it as they gradually consume it. Normal rats are likewise rather wasteful and haphazard in their eating habits. Once a hypothalamic lesion has been made, the animals are more efficient, eating every crumb; monkeys eat seeds, peelings of fruit, egg shells and even paper food containers. This renders the determination of comparative caloric intakes somewhat difficult. Even when this is controlled the animals with lesions outgain the controls.

More important still is the fact that animals tending to become obese eat their limited food rations all at once. It is well known that the body is able to establish some compensation for starvation or reduced food input. Metabolism drops, activity decreases, and when food is obtained there is a tendency to push an abnormally large proportion into fat as though the organism were anticipating another long fast. When one of these obese animals eats its daily ration in fifteen minutes, it has a momentary plethora and then 23 hours and 45 minutes of starvation. The Yale group thought this starvation-plethora cycle might explain the abnormal ability of these

animals to gain in weight on a reduced caloric diet:⁽¹⁰⁾ the single enormous meal really exceeded their requirement and the excess was stored as fat. This sounded so reasonable that many clinicians advised their overweight patients, in addition to reducing their diet, to eat rather continuously; they claimed excellent results. Unfortunately, it is not so simple as that, because when the potentially obese rats were prevented from eating in this way by the delivery of equal portions of their daily ration at three hour intervals, they still outgained controls with which they were pair fed.⁽¹¹⁾

The ability of these potentially obese animals to outgain normal animals is not great. When they are pair fed with normal rats, which are fed in such a manner that they must compensate in order to maintain their body weight, then the animals with lesions cannot outgain the normal controls.⁽¹²⁾

At the end of all this it does seem clear that after appropriate hypothalamic injury rats and monkeys can attain a degree of obesity on the same amount of food as normal controls eat, or as they ate before operation without accumulating adipose tissue.

Why can a potentially obese animal outgain a normal animal on the same caloric intake? The answer to this is that there is a lesser caloric output.

In the first place activity is reduced. As an animal becomes heavier, a smaller amount of activity requires a greater energy output, and this should contribute to the establishment of the static phase of obesity.^{(13) (14)} Normally when activity is reduced the appetite also decreases.

Secondly, the basal metabolic rate is reduced. As animals become bigger the total oxygen use tends to exceed normal, and this tends to cause the weight to form a plateau. Raising of the amount of oxygen used slows or stops weight gain.⁽¹⁵⁾ Normally when the metabolism is reduced the appetite is reduced proportionately—as in hot weather. It is not known how the hypothalamic lesions reduce activity and metabolism; but this is rather unimportant, even though it permits animals to outgain controls on the same diet, because these degrees of inactivity and reduced metabolism can be created without the creation of obesity. The important thing is that the appetite has lost all relation to energy requirement.

The appetite and eating habits of these animals after lesions have been made are certainly abnormal. As was stated in the preceding lecture, meal size increases, the frequency of eating increases and the total food intake is doubled or tripled. At the same time energy output is reduced. The appetite is no longer controlled by the caloric requirements of the animal.

The two questions which next presented themselves were: (i) Why do the animals have an increased appetite? (ii) Why does injury to the ventromedian nucleus cause the bulimia? Neither has been answered, but some possibilities have been considered.

No increase in stomach activity giving a false hunger^{(16) (17)} sensation is responsible. A few animals in which the vagi (motor nerves to the stomach) were cut did not attain obesity, but all of them had digestive difficulty, and it was felt that the experiments were inconclusive. Gastrectomized rats do become obese. They have less capacity, but they eat more frequently, and the duodenum gradually expands until meal size is about two grammes.

The obese animal may have a low blood sugar level. Insulin, by reducing blood sugar level, augments appetite. These animals, however, do not have excess insulin. As a matter of fact, because of their tremendous food intake, they tend to overwork their islet tissue. Slight reduction in size of the pancreas creates *diabetes mellitus*. Apparently the low blood sugar level is due to the fact that the liver fills up with fat and cannot store normal amounts of glycogen. The appetite can be said to have caused the low fasting blood sugar level. The low level may play a part in the vicious cycle, but it does not cause the initial bulimia. Early in obesity before the liver fills with fat the blood sugar is held at a normal level.

It is rather too bad that excess insulin cannot be found in obesity, because it would make such a nice story.

Wertheimer⁽²⁰⁾ and others have found that insulin favours transfer of carbohydrate to fat. This formation of new fat under insulin influence precedes an insulin effect on appetite. Finally, obesity has actually been produced in rats by long-continued injections of massive doses of protamine insulin.

It is easy to say that the hypothalamic lesions destroy centres of control or break connexions to such centres; but that tells us nothing of the nature of the control.

Obesity-producing hypothalamic lesions completely change the personalities of rats. They become vicious, attacking all objects with which they come into contact. Although this emotional instability gradually subsides, any unusual disturbance elicits an over-reaction. During the initial outburst and over-activity the exaggeration of eating occurs. Disturbing the animals always results eventually in an attack upon their food, and they begin eating. This emotional instability might be in part responsible for establishment of bulimia, as it is in human beings. Unfortunately for this hypothesis, monkeys became much more calm and tractable after operation. We still do not know why injury of the ventromedian nuclei divorces appetite from its normal relationships to energy output.

Starvation will reduce obesity, and a sufficient reduction of food intake will prevent obesity. The food intake, however, must be reduced to the level of the individual's own energy requirement, and not merely to that of some other individual.⁽²¹⁾

In absolute starvation animals die long before fat stores are exhausted. Quick reductions of body weight in this drastic way do not appeal to me as being safe. In any dietary reduction one must consider the needs of the vital cells for food materials, vitamins, minerals *et cetera*.

Two minor points are worthy of mention at this time—both a little unfortunate from the standpoint of an obese individual. (i) When a drive toward obesity is established by a lesion, it persists indefinitely even though obesity may be prevented by dietary restrictions. As soon as enough food is available obesity develops, even though the animal is not liberated from restriction until on the verge of senescence.⁽²²⁾ (ii) Judging from a few cases thus tested, when an animal is permitted to indulge until it becomes obese it eventually spontaneously establishes its own weight plateau, which remains quite constant. If one then institutes a *régime* of starvation and food reduction until its body weight becomes almost normal, and then permits the animal to eat *ad libitum*, it again reaches a plateau of obesity; but this time the weight level is much higher.⁽²³⁾ The moral of this seems to be that obese people should not make any good resolutions at all unless they keep them.

Clinical Obesity.

The clinical cases of obesity resulting from trauma, tumours, measles, meningitis, rheumatic fever and other diseases capable of producing central nervous system injury may be akin to experimentally produced hypothalamic obesity, but not all obesities have this origin.

There seems to be such a thing as an hereditary tendency towards obesity. The hereditary Laurence-Moon-Biedl syndrome involves obesity. There is a race of obese mice now under cultivation. In the case of the mice there is an abnormality of appetite.⁽²⁴⁾

The common form of human obesity of the low intensity variety (200 to 300 pounds) is probably due to psychological causes. It is generally agreed that obese individuals are victims of circumstance, and their obesity is the result solely of a perverted appetite. Many are simply victims of early training. They have been conditioned to a higher "satiety level" than is required by the physiological needs of the body. Over-eating can become a habit. It is a type of self-indulgence and pleasure open to all, which can be used as compensation when other common channels that normally bring satisfaction are blocked. When activity is reduced and interests in life are narrowed, it is an easy thing to fall victim to the pleasure of eating. Women in particular

are at a disadvantage. They are subject to greater confinement of activity and interests, and they have a basal caloric requirement 10% lower than that of men.

Obesity does not occur where there are food shortages. There were no obese people in Germany at the end of the first world war and there are few now; there were 100,000 cases of nutritional oedema in Hamburg last winter (1946). The cause of obesity is merely the ingestion of more food than is necessary to meet that individual's energy output. The treatment of obesity by starvation and diet is always successful in reducing weight. Individuals weighing 300 pounds generally have a basal metabolism of between 2100 and 2800 Calories per day. If they are given only 1200 Calories of food, weight will come down.⁽²⁵⁾ One must be careful not to create vitamin and other deficiencies in doing this. Reduction in intake of Calories should involve foods not important as sources of minerals, essential proteins and vitamins. The frequently used high protein, low fat, low carbohydrate reducing diet appeals to me as sensible. Protein can be converted to carbohydrate and fat (58%); but if carbohydrate intake is low it goes to and is burned as carbohydrate. The caloric deficiency must be made up by burning body fat—other tissues being protected by abundant protein and adequate carbohydrate.

Body weight reduction may not be a satisfactorily steady process to the subject. Work by Newburgh⁽²⁶⁾ has shown, however, that the predicted weight losses are finally met, although some water is held back early in the starvation period and this gives a false idea of actual tissue loss.

Obese persons lose fat from their stores as readily as normal persons do. Because of their excess weight they require more energy to support normal activity; but the caloric value of fat is so high that weight loss is difficult. Even in the non-obese individual 100 times more energy is stored as fat than as carbohydrate.⁽²⁷⁾

The loss of weight associated with loss of carbohydrate stores is very satisfactory. Each gramme of glycogen lost associates itself with a loss of three grammes of water, so that by losing 100 grammes of carbohydrate one loses 400 grammes of weight and has to reduce his diet by only 400 Calories; but to lose 400 grammes of weight by loss of stored fat the dietary reduction must be 3600 Calories. A great deal of work must be done and a very great reduction in caloric intake must be adhered to in order to lose fat. It is much easier to avoid deposition of fat than it is to get rid of it. Moreover, a little fat in the diet goes a long way. One ounce of fat pork is equivalent in fuel value to about two pounds of cabbage, and one ounce of olive oil to three pounds of lettuce.

Increase of energy output by thyroxin or drugs is apt to be dangerous. Exercise may be dangerous and may increase the appetite. Reduction of appetite by means of drugs such as benzedrine and by *p*-amphetamine *et cetera* is still rather uncertain and questionable.⁽²⁸⁾

The cure depends upon limitation of energy intake to the required output. It depends upon reacquiring other activities and interests which are capable of dwarfing the importance of eating. Human obesity is largely a psychiatric problem.

Conclusion.

At the beginning of this lecture I posed a question and attempted to answer it. The question was—what is the nature of the abnormality of imbalance which results in obesity? The abnormality appears to be an appetite which is not regulated by the individual's energy requirement. Unfortunately I have not been able to tell you much about appetite or why brain injury modifies it. Although there is a basic ability to meet an instinctive hunger drive and balance food intake with energy output, the complexities of life are such that this is not reliable. Man must use his intelligence in controlling his food intake as he does in controlling his other behaviour.

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INGUINAL HERNIA: A REVIEW OF TREATMENT.

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RECORDS of the treatment of inguinal hernia date back to the days of Hippocrates (400 B.C.) and even earlier, but the modern treatment begins with the operations introduced by Bassini and Halsted towards the end of the last century. There has been some doubt about priority. Most authorities now agree that Bassini was the first in the field, and investigations substantiate that claim. In a paper dated "Padua, July, 1889", he described his operation based on 251 cases going back as far as 1884; this paper, however, did not appear until the following year (1890). In the meantime, Halsted had described his operation—based only on five reported cases—in November, 1889.

Bassini's Operation.

As Bassini's operation has been modified so often—Mair reports having found over 70 modifications in the literature—and as the original has been, and still is, variously interpreted, it may be as well to record an English translation of part of his own description. After exposing the inguinal canal, isolating and opening the sac and dealing with its contents, twisting and ligating the neck, and excising the sac, he proceeds as follows:

I retract the isolated spermatic cord, placing it gently on the abdominal wall. I do the same, when it is necessary, with the testicles, which would be pulled out of the scrotum; with sharp and broad hooks I retract the lower leaf of the aponeurosis of the external oblique muscle downwards, the upper leaf upwards, and in this manner one succeeds in exposing the groove which is formed by Poupart's ligament until its posterior edge, and one cm. above the place where the spermatic cord comes out of the iliac fossa, are exposed; next I

free up the external edge of the rectus abdominis muscle and the threefold layer which is formed by: *Musculus obliquus internus*, *M. transversus*, *Fascia verticalis Cooperi* (the *fascia transversalis*), from the aponeurosis of the external oblique muscle and from the sub-serosal adipose tissue until the threefold layer can be sewed to the posterior edge of Poupart's ligament without difficulty. After this is done I sew these two parts together with interrupted sutures, for a length of 5 to 7 cm., from the crest of the os pubis to the point of emergence of the spermatic cord, which is shifted about 1 cm. towards the anterior superior iliac spine. With this the third part of the operation is finished, and the internal or abdominal ring and the posterior wall of the inguinal canal are restored. It is advisable to use interrupted silk sutures and to sew 2 to 3 cm. from the edge of the threefold muscular-aponeurotic layer.

The remainder of the operation consists in replacing the spermatic cord and sewing up the external oblique aponeurosis and skin in front of it. The essential steps to be gathered from his description are complete exposure of the inguinal canal, twisting of the neck, and high ligation and excision of the sac, the repair by drawing a threefold layer down to Poupart's ligament behind the cord, and the use of interrupted silk sutures.

Many of these essential steps have since been discarded, and this probably accounts, in part, for a good deal of the disrepute into which the operation has fallen in recent years. Thus Ogilvie is very strong in his condemnation of the operation; some of his published comments include the following:

I have no wish to belittle Bassini himself; for he first pointed out the necessity of opening up the whole inguinal canal and ligating the sac at its neck, the basic principle of any sound operation. He was a very great man; so were *Æsculapius*, *Hippocrates* and *Galen* great men. In honouring them we honour ourselves. Their writings should remain, but remain in the library, and not in the student's textbook; their operations should be remembered, but they belong to the museum, and not in the operating theatre.

Again:

That this barbarism [Bassini operation] should have survived into an age when all other pioneer operations have been refined and perfected by constant thought and care, and that it should be still universally taught and widely practised, is an indication of the scant attention paid to the inguinal canal by men engrossed in more dramatic regions, and a blot upon modern surgery. . . . I know more than 100 surgeons whom I would cheerfully allow to remove my gall-bladder, but only one whom I should like to expose my inguinal canal.

On the other hand, there are still many admirers and defenders of the Bassini operation; Harley Turnbull (1946) makes the following statement:

The Bassini operation must not die. It must be retained in surgery until such time as the ideal is found. To abandon the operation would be a retrograde step in the repair of hernia and recurrences would inevitably increase.

Gordon quotes, from the Bassini Institute in Italy, a series of 10,000 cases of this operation with a recurrence rate of 1% to 2%. In a series of 216 cases followed up to 1889, approximately five years after he had introduced his operation, Bassini had a recurrence rate of 3%. Such good figures are not available for the operation as practised today.

To the writer, the favourable points in the operation, as described by Bassini, are the following: (i) The free exposure of the inguinal canal and high excision of the sac. Everyone will agree that this is essential in all cases of indirect hernia, and applies also in a modified form to direct hernia. (ii) The suture of the *fascia transversalis* to Poupart's ligament. This ensures a strong barrier in the floor of the canal, but unfortunately cannot be done in many cases of large hernia where the gap is too big or the *fascia transversalis* is frayed out and often indefinable. (iii) The use of interrupted silk sutures. Experience since 1889 has shown that non-absorbable sutures, such as silk, should be used throughout in all

hernia repairs. It is of interest to recall that the use of silk was recommended by Bassini and that it is not a more recent innovation. At the present time other non-absorbable suture materials, such as cotton, nylon and fine steel wire, are being used with good results.

Perhaps the greatest criticism that can be levelled against the Bassini repair as practised today—suture of the conjoined tendon to Poupart's ligament behind the cord—is that it is too often unnecessarily carried out. With a small congenital sac and good musculature, a simple excision of the sac is sufficient; by the carrying out of a Bassini repair, irreparable damage is done to the muscular mechanism upon which the integrity of the inguinal canal partly depends. It is now agreed by many (but not by all) authorities that the internal oblique and transversus muscles with their conjoined tendon should never be interfered with by being sutured down to Poupart's ligament in the repair of an inguinal hernia. Pressure necrosis and atrophy of the lower muscle fibres of the conjoined tendon have frequently been found to follow this type of repair. Further, when the operation is used in the repair of large hernia, the conjoined tendons already may be so atrophied that they are of little value as a means of support.

Halsted's Operation.

Halsted's original operation, as described in 1889, was quite different from that of Bassini. A few extracts from his paper may be of interest here:

The sac is opened, and dissected from the tissues which envelope it. The abdominal cavity is closed by quilted sutures passed through the peritoneum at a level higher by 1½-2 inches than that of the so-called neck of the sac.

The *vas deferens*, and its vessels, are transplanted to the upper outer angle of the wound.

Interrupted strong silk sutures, passed so as to include everything between skin and the peritoneum, are used to close the deeper portions of the wound, which is sewed from the crest of the pubes to the upper outer angle of the incision. The cord now lies superficial to these sutures, and emerges through the abdominal muscles about one inch to the inner side of the anterior superior spine of the ilium.

From this it is seen that his original repair was a posterior one, the spermatic cord being transplanted anteriorly to the external oblique aponeurosis, and he closed all the structures of the abdominal wall behind the cord in one layer with interrupted mattress sutures.

As we shall see later, Halsted further modified this procedure; but next in chronological order should be placed Ferguson's operation, as this exemplifies many principles later described by Halsted, which are still in use and of fundamental value today.

Ferguson's Operation.

A. H. Ferguson, professor of surgery at the Chicago Post-Graduate Medical School, described his operation in July, 1899. He states that, after the sac has been excised in the usual manner,

... the transplantation of the stump of the sac high up underneath the deep muscle, or twisting it and entering it at the internal ring has nothing special to recommend it. ... The cord is not disturbed. ... Tearing the cord out of its bed is without any anatomic reason to recommend it. ... The veins of the cord should not be disturbed. ... The cremaster muscle is allowed to hug the cord and is reattached to the internal oblique muscle. ... The transversalis fascia, which forms the internal ring being stretched by the hernia, is sutured up with a separate suture, or with the suture used to sew the internal oblique muscle to Poupart's ligament. ... The key to the radical cure of oblique inguinal hernia is to suture the internal oblique muscle and its tendon to the inner aspect of Poupart's ligament as low down as possible, without undue tension, after having ablated the sac, and strengthened the internal ring with a few stitches above the root of the cord. Any operation for cure of hernia that diverts the cord from its natural course favours return, endangers the testicle and is empirical.

It will be seen that this was entirely an anterior repair of the inguinal canal, the essential points of interest today being the three following. (i) The cord was not touched or transplanted. This should be the essence of the simple excision of the sac today in young adults with good musculature and no defect of the posterior wall of the canal; but how frequently surgeons needlessly haul out with their fingers the whole cord as soon as the external oblique has been incised! (ii) The internal ring is narrowed by the suturing of the *fascia transversalis* at this site. The cremaster is closed in its original position around the cord. Again, this definite covering layer of the cord is frequently completely ignored or deliberately injured by being torn through, and no attempt is made to repair it later on. (iii) The internal oblique and transversus muscles are sewn to Poupart's ligament in front of the cord; the external oblique aponeurosis is approximated in front of this.

Halsted in 1903 changed his original posterior repair to an anterior repair by suturing the internal oblique and transversus muscles to Poupart's ligament in front of the cord, and overlapping the external oblique aponeurosis in front of this. He also recommended transplanting the ligated neck of the sac up under the internal oblique muscle, and drawing the lower flap of the cremaster and its fascia up under the internal oblique.

Since the publication of Bassini's operation, many modifications and new operations have been advocated in an attempt to improve the results. Some of the better known will now be briefly described.

Wyllys Andrews Operation (1895).

The internal oblique and conjoined tendon are sutured to Poupart's ligament behind the cord. The last-mentioned is placed in a bed formed by overlapping of the external oblique, the upper flap being sewn to Poupart's ligament behind the cord, and the lower flap brought up in front of the cord and sutured to the aponeurosis.

Concentrating more on the anterior wall and providing a new canal for the cord, this operation fails to correct fully the underlying pathology—a defect in the posterior wall of the canal. It also fails when the external oblique aponeurosis is often frayed out with a large hernia, and one of its flaps placed behind the cord is not nearly sufficient support against a recurrence.

Bloodgood's Operation (1898).

The rectus muscle and its anterior sheath, which has been incised, are drawn down and sutured, with the internal oblique and conjoined tendon, to Poupart's ligament. Modifications of this operation, sometimes used today, include turning down a triangular flap of the rectus sheath and suturing it to Poupart's ligament, and a "slide" operation, in which a relaxing incision made in the anterior sheath of the rectus allows the conjoined tendon to be sutured to Poupart's ligament without tension.

The Bloodgood operation, while uniting fascia to fascia, leaves a potential weakness at the site from which the rectus and its fascia are displaced. The modified "slide" operation, as advocated by Tanner, suffers from the same objections as Bassini's, in that the conjoined tendon is sutured to Poupart's ligament.

McGavin's Filigree Operation (1909).

After removal of the sac, the deep epigastric artery is divided between ligatures, and a filigree is placed on the posterior wall of the inguinal canal, and retained by suture of the internal oblique muscle to Poupart's ligament. The cord is replaced and a second filigree is inserted under the external oblique aponeurosis.

Cole has successfully used this type of operation; although not widely practised, it fulfils one essential in the repair of a large inguinal hernia when there is a deficiency in the posterior wall of the canal requiring to be strengthened by the introduction of some extraneous material—in this case a filigree.

Gallie's Operation (1921).

A fascial repair is carried out by interlacing strands of fascia lata between the conjoined tendon and Poupart's ligament behind the cord. By this means a strong barrier is introduced to replace a defect in the posterior wall of the canal. This operation has been widely used, and the results on the whole have been good. However, the operation has been criticized on the following points: (i) it is necessary to operate on the thigh to obtain the fascia; (ii) the fascia itself in time becomes thinned out and absorbed (Babcock).

With regard to the first objection, the operation on the thigh can be rapidly carried out by the use of a fasciotome through a small incision. One strip of fascia lata about one inch wide is sufficient, and this is separated into three or four narrower strips. To obviate operation on the thigh, strips of fascia may be taken from the external oblique aponeurosis as advocated by McArthur (1904); but often in the cases in which it is most needed, not enough fascia can be obtained from the frayed aponeurosis.

With regard to the second objection, though the fascia may eventually be absorbed, most surgeons agree that it remains *in situ* long enough for a firm fibrous tissue sheet to form, and on this the strength of the repair finally depends. Maingot makes use of floss silk to interlace between the conjoined tendon and Poupart's ligament. This makes a very satisfactory repair, and in Maingot's hands the results have been good; however, other surgeons (Edwards, and others) have reported an increased incidence of sepsis with the use of floss silk, and thus the operation has not been more widely used.

Skin Graft Operation.

A full thickness skin graft, cut from the site of the operation, is anchored under tension between the conjoined tendon and Poupart's ligament behind the cord. This operation is of fairly recent origin, advocated by Mair, and the results are said to be good. However, the boggy of sepsis has also to be faced here, and the effects of sepsis in the repair of hernia can be disastrous.

Schmieden's Operation.

The essential steps in Schmieden's operation aim at creating a new internal ring. In the original operation, the testis and cord were delivered, an opening was made in the internal oblique and transversus muscles above and lateral to the internal ring, and the testis and cord were brought out through this opening. To obviate dislocation of the testis, the operation has been modified by division of the internal oblique and transversus muscles parallel to Poupart's ligament, implantation of the cord in this opening, and suture of the incised muscles. The original internal ring, with its inherent weakness and predisposition to recurrence, can then be completely closed. It is held that the action of these incised muscles in the mechanism of the inguinal canal is not appreciably interfered with by this operation.

Causes of Recurrences.

The published recurrence rate for inguinal hernia varies in different clinics throughout the world. In general, the figures vary from 0% to 20%, with an average of 12%. There is no doubt that this figure can be greatly improved. Meticulous attention to detail and the carrying out of the correct type of repair for each individual hernia are two fundamental ways in which all surgeons can maintain uniformly good results. As far as one can see, there will always be a certain percentage of recurrences due to factors largely beyond the surgeon's control (such as the amount of stretching that may take place in fibrous tissues of the repair); but the aim should be to keep this percentage as low as possible (1% to 2%) by taking all possible precautions.

The many causes of recurrence may be considered under the headings: "pre-operative", "operative" and "post-operative".

Pre-Operative Causes.

The first pre-operative cause is unsuitable selection of patient. Careful pre-operative supervision should be carried out to exclude or minimize such factors predisposing to recurrence as asthma and bronchitis, obstruction to the lower part of the urinary tract from an enlarged prostate or stricture, excessive obesity, and debilitating general disease. The age of the patient is in itself not a bar to operation; but the older the patient the worse the results, as the hernia is often large and the tissues of the inguinal region are very poor.

The factor of incorrect diagnosis should be corrected at the operation, at which, if there is any doubt, a search is made for a direct hernia after an indirect sac has been excised, and *vice versa*.

Failure to detect and correct a "sliding" hernia is another cause of recurrence.

Operative Causes.

Anæsthesia.—Practically any recognized form of anæsthesia can be safely used for the operation, provided that complete relaxation of the muscles is attained, and much depends on the skill of the anæsthetist. However, when a choice is possible, either spinal or local anæsthesia is the best; thus post-operative straining from coughing or vomiting is reduced to a minimum. This early post-operative straining is a potent factor in the development of a recurrence, and is to be avoided as far as possible.

Wrong Choice of Operation.—Unnecessary interference with the musculature of the inguinal canal, when no weakness is present, is to be deprecated. Conversely, failure to narrow the internal ring or to provide a competent barrier to replace a deficiency in the wall of the canal is only inviting a recurrence.

Poor Technique.—Poor technique includes such deviations from fundamental principles in operative technique as rough handling of tissues, tearing instead of cutting and stripping, inadequate hæmostasis, faulty asepsis, insecure knots, and sutures tied under too great tension. In this particular operation are included as well failure to clear away areolar and fatty tissue before approximating fascial layers, incomplete excision of the sac, and damage to the ilio-inguinal and ilio-hypogastric nerves. The operation should always be regarded as a major surgical procedure and not be left to inexperienced operators; this still happens despite repeated warnings in recent years.

Improper Suture Material.—Most authorities condemn the use of absorbable sutures such as catgut. Longacre reports the following recurrence rates (Table I):

TABLE I.

Type of Hernia.	Catgut Sutures.	Silk Sutures.
Indirect hernia	12.5%	3.4%
Direct hernia	13.6%	4.49%

Unabsorbable suture material such as silk, cotton, nylon or fine steel wire should be used.

Performance of Bilateral Operations at the Same Time.—It is considered a safe procedure to carry out a bilateral hernial operation on infants, and on adults when an excision of the sac with or without narrowing of the internal ring is all that is required. But when a more extensive and bilateral repair is necessary, and especially in the case of patients over forty-five years of age, it is much safer to perform two separate operations. Too much tension is put on the lower inguinal region when extensive bilateral repairs are made at the same time, and the compensatory effect of the opposite side, which aids in the firm healing of the operated side, is lost.

Post-Operative Causes.

Too Early Weight Bearing.—Despite the modern tendency to allow patients out of bed within twenty-four to

forty-eight hours of their operations, and however advantageous this procedure may be after other operations, it is still contraindicated when any hernial repair has been carried out. If too early weight bearing is allowed, the patients are very apt to put an excessive strain on the repair before sound healing has occurred, and it is on the development of firm scar tissue that all repairs depend for their ultimate strength and reliability. Three weeks in bed is still the ideal average time for patients who have had a hernial repair. When a simple excision of the sac is all that has been carried out, much earlier rising—within twenty-four to forty-eight hours of operation—is recommended; by this means the incidence of post-operative pulmonary lesions, abdominal distension and retention of urine is lowered. Gentle abdominal exercises should be initiated during the second post-operative week, whether the patient is allowed up or remains in bed.

Coughing and Straining et cetera.—Failure to warn the patient to avoid, as far as possible, coughing, straining at stool or micturition, and heavy lifting or strenuous work for at least three months from the time of his operation is another cause of recurrence. Patients with large herniæ and poor muscles and aponeurotic tissues should avoid strenuous work for a longer time, and some should be encouraged to obtain a lighter occupation.

Post-Operative Complications.—It has been stated that the fate of a hernial repair has been sealed on the operating table. Preventive measures must be taken before and during the operation to eliminate as far as possible such complications as sepsis of the wound—which may lead to a complete breakdown of the repair—pulmonary complications and distension of the intestinal tract or bladder.

Mechanism of the Inguinal Musculature and Internal Abdominal Ring.

The following are the old and modern views of the mechanism of the inguinal musculature and internal abdominal ring.

Old View.

Keith (1923) described the conjoined muscle as a shutter, rather than a sphincter, with a mechanism similar to that which closes the eyelids, the inguinal ligament representing the lower lid and remaining stationary. He also held that the development of hernia was pre-disposed to by a weakness of the groin in man, who has had to adapt this part of his anatomy to the upright position, and not to the presence of a preformed sac as postulated by Hamilton Russell.

Modern View.

We owe the present day theory of the mechanism to Lytle of Sheffield. He has stated that the internal inguinal ring, under conditions of stress, moves upwards and outwards behind the transversus muscle when that muscle contracts. The opening of the ring is thus protected. The mechanism is that of a "sliding valve", and not that of a sphincter or shutter, and it is arranged to avoid excessive pressure on the spermatic cord, which both the last-mentioned mechanisms would tend to exert. Thus it is important in the repair of an indirect inguinal hernia to ascertain the state of the internal ring; there may be defects in size, mobility or strength. In such cases repair of this structure—usually by suturing its margins—is an important step in the operation. Ogilvie has stressed the part played by the cremaster muscle, on contraction of the abdominal muscles, in pulling the cord upwards, tending to retract it into the abdomen against the efforts of the abdominal muscle to expel it. It follows that this muscle should be preserved when possible in the repair of an inguinal hernia.

With regard to the ætiology of the indirect sac, it is now held that both the congenital sac (as postulated by Hamilton Russell) and the acquired sac (as postulated by Keith) occur. The characteristic features of each are as follows. The congenital indirect hernial sac is relatively long, with a narrow neck and thin walls, and is difficult to separate from the adjacent structures of the

cord. It remains within the infundibuliform fascia (the covering of the cord derived from the *fascia transversalis*). The acquired indirect hernial sac is relatively short, with a wide neck and thick walls, and is easily separated from adjacent structures. As it enlarges it often breaks through the infundibuliform fascia and comes to lie outside this layer.

Conclusions.

It is contended that in the present state of our knowledge, the following operations, carried out as indicated, give the best results in the treatment of inguinal hernia.

1. Simple high excision of the sac. For infants, and for young adults with good musculature, a congenital sac, no enlargement of the internal ring and no defect in the floor of the canal, this is sufficient. In other cases, some repair is necessary; in all cases, repair is preceded by excision of the sac at its neck, and non-absorbable suture material should be used throughout. The requisite repair may be narrowing of the internal ring.

2. Narrowing of the internal ring. This is best carried out by suturing the edges of the *fascia transversalis* lateral to the cord at the site of the ring. No tension should be required to approximate these edges, otherwise a more extensive repair is necessary. This suffices when the internal ring is between half and one inch in diameter, and no other weakness of the inguinal canal exists. If the diameter is more than one inch, a more extensive repair is usually required.

3. Repair of the *fascia transversalis*. (a) This is used in cases of "funicular" hernia, when there is a small gap in the *fascia transversalis* allowing a direct hernia to occur. If it is small, this gap may be satisfactorily closed without tension by approximation of the edges. If it is large, the gap is better filled by the introduction of some extraneous material such as strips of fascia, a skin graft or a metal grid. (b) In some cases of relatively small direct or indirect herniæ, where there is a weakness of the posterior wall of the canal, this may be strengthened satisfactorily by approximation of the *fascia transversalis* to Poupart's ligament.

As Wakeley (1940) has pointed out, physiological union is more likely to occur by the approximation of fascia to fascia, than by attempts to unite the muscles of the conjoined tendon to Poupart's ligament. The fascial union also provides a stronger barrier than the musculoligamentous union, is less liable to become attenuated, and leaves the muscles free to carry on their normal function.

It is of interest to recall that fascia to fascia union was an essential part of Bassini's operation. Surgeons who have carried out this operation in detail contend that this is the basic reason for their numerous good results. For years now the Bassini operation, as practised by most, has come to mean a high excision of the sac, with a repair carried out by uniting the conjoined tendon to Poupart's ligament. This so-called Bassini operation should have no place in modern surgery, as it is physiologically unsound, interferes with the muscular mechanism of the inguinal canal, and, what is more important, rarely provides a sufficiently strong and permanent barrier against recurrence. Even the undoubted improvement brought about by relaxing incisions in the rectus sheath, as illustrated by various "slide" operations, does not overcome the fundamental weaknesses outlined above.

4. Introduction of a strong sheet of tissue to eliminate a deficiency in the posterior wall of the canal. This is indicated in cases of large indirect and most direct herniæ, in which the structures in the floor of the canal—particularly the *fascia transversalis*—may be very attenuated or even absent.

To attempt to approximate the poor tissues which are left after the removal of the sac is to invite recurrence. In many cases this can be done, and at the end of the operation the result may look nice and even relatively strong; but this is to view the result at a close range early in its existence, and while the tissues are still relaxed under anaesthesia. Experience has shown that this type of repair—though still commonly used, mainly

because it is relatively easy and convenient to perform—yields poor end results; that is, the incidence of recurrence is high.

It is generally agreed now by most experienced surgeons that such a deficiency must be filled by the introduction of some extraneous material rather than by an attempt to approximate the poor tissues present. Many different substances have been used to fill the gap, among them being fascia, silk, floss silk, full thickness skin graft, a filigree and lattice of fine wire. It does not seem to matter a great deal which material is employed—and surgeons vary in their fancy—provided that one of the recognized substances is chosen, and that the operation is meticulously carried out; the last is the important point. If fascia is used it may be taken as strips from the thigh (Gallie), or from the external oblique aponeurosis, or as a whole graft or transplant. In very few cases can sufficient be obtained from the external oblique to carry out an extensive repair. The *fascia lata* still provides the best site for obtaining the fascia. It is best obtained by a fasciotome through a small incision, though some surgeons prefer to use a long incision on the outer side of the thigh. *Fascia lata* transplants from the adjacent anterior aspect of the thigh are also favoured by some.

The Position of the Spermatic Cord.

The spermatic cord is better placed anterior to the external oblique aponeurosis after an extensive repair, so that the external oblique is used to reinforce the repair. The superficial fascial layers of the abdominal wall should be carefully sutured in a separate layer anterior to the cord, before the skin is approximated.

An objection sometimes raised to the placing of the cord in this position is that the new external ring is directly in front of the internal ring, and that this will predispose to a direct recurrence in this region. However, most authorities agree that a recurrence here is due to a faulty repair, or to a breakdown, of the structures surrounding the internal ring; if this occurs, then a direct hernia will appear at this site, no matter where the external ring is placed.

Excision of the cord and testis is indicated in the following circumstances: (i) when the patient is young and has an associated undescended and atrophic testis, if it is impossible to replace the testis in the scrotum after repairing the hernia; (ii) when the patient is an elderly man with a large hernia requiring an extensive repair of the poor tissues of the inguinal canal; the entire inguinal region is then completely closed, and recurrence is very unlikely.

Finally, it may be repeated that most authorities favour the abolition of the Bassini operation as practised today, while still retaining some of the fundamental principles as laid down by that pioneer surgeon, but not always attributed to him.

It should be remembered that there is no one operation which will cover all the different types and degrees of inguinal hernia. Each case must be considered and treated individually, and so far no known operation is absolutely proof against recurrence.

Summary.

1. A short historical review of the treatment of inguinal hernia is given
2. The causes of recurrence are discussed, and the modern view of the mechanism of the inguinal musculature and internal ring is stated.
3. An attempt has been made to assess the operations which today are likely to give the best results.

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TUBERCULOSIS OF THE UPPER PART OF THE RESPIRATORY TRACT, WITH A REPORT OF A CASE.

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THE mode of entry into the human body of the tubercle bacillus in inhalation infection offers opportunity of a high order to the invader to "settle on" and "infect" any of the extensive area of mucous membrane from the nasal and oral orifices to the pulmonary tissue. It is therefore a matter of considerable interest that tuberculosis of the upper portion of the respiratory tract, either in part or extensively, does not occur more frequently. In particular, gross tuberculosis of the nose, an organ which must encounter the tubercle bacillus frequently and repeatedly in most civilized communities, is a rarity of great clinical interest. The Oslerian dictum of "the seed and the soil" finds here a ready example—"some fell upon stony places"—and the relative immunity of the nose to tuberculous disease surely entitles that organ to a place in any catalogue of petrous infertility. Myerson⁽¹⁾ states that "tuberculous infection of the nose and nasal passages is the rarest form of localized tuberculosis", and the record of the case here reported presents a picture rare indeed in a sanatorium population.

Report of a Case.

B.H., a male patient, aged thirty-eight years, unmarried, was admitted to the sanatorium on October 2, 1946, for treatment of pulmonary tuberculosis. Although very ill and febrile, he was able to supply adequate details of his medical history and symptoms. He had been a market gardener for many years, but for the preceding eighteen months he had worked with plastics as a moulder in a

factory. His family history was vague, but there was no known contact with any person suffering from tuberculosis. About ten weeks prior to his admission to the sanatorium he had developed huskiness of the voice, at first intermittent, but becoming progressively worse; difficulty in swallowing had developed later, and had been present for about seven days. About six weeks previously cough had occurred, with little sputum, and had persisted. (The sputum was tested on September 10, 1946, at the Alfred Hospital, Prahran, and was reported to contain tubercle bacilli.) At this stage he had retired to bed, and rapidly lost condition. Inhalations were prescribed, and their use was followed by redness and swelling of the nose and surrounding parts, with some ulceration inside the nostrils. A sulphonamide drug (not specified) had been taken in the usual dosage for three days before his admission to hospital. The nasal trouble was thought to have been slightly relieved in the last few days.

His condition on admission to the sanatorium was as follows. He was obviously very ill, and felt fatigued; he was febrile (his temperature was 100° F.); he was mentally normal; he was very thin (his weight was 84 pounds and had been 108 pounds a few months before); his voice was husky; and he had some cough with a little sputum. His facial appearance was most arresting; pronounced erythema and oedema of the soft tissues of the nose and surrounding parts were present, resembling acute cellulitis. Some ulceration was present just within the anterior nares, more on the right side. Oedema of the fauces and soft palate was present, with a small area of ulceration on the right tonsil; small areas of irregular inflammation were observed on the hard palate, more on the right side. Laryngeal examination could not be made satisfactorily. Examination of the body resulted as follows. The breath sounds were generally harsh, and had a bronchial quality in the upper half of the lung on either side; no adventitious were audible. The heart was normal in size and position; the sounds were clear and the pulse was regular. The blood pressure was 80 millimetres of mercury, systolic, and 60 millimetres, diastolic. The findings in the other systems were within normal limits.

The treatment prescribed was symptomatic, with sedative spray for throat, consisting of "Dedicalin" in 2% solution; the nostrils were cleaned with saline solution and "Vaseline" was applied as required.

On October 3 a course of sulphamerazine tablets was commenced in the usual dosage and continued for five days, the amount of the drug administered being 24 grammes. On October 8 it was thought that the appearance of the face was slightly improved, and the patient stated that he felt more comfortable. The temperature ranged from 99° F. in the morning to 102° F. in the evening.

X-ray examination of the chest revealed fine nodular infiltration in the upper half of both lungs, with some coalescence and organization. No cavitation was seen. Pleural adhesions were found in both lung bases.

Other pathological investigations performed during the next few days gave the following results. Estimation of the blood sedimentation rate revealed a fall of 20 millimetres in one hour; the cell volume was 50%; room temperature was 55° F. (Cutler). Ziehl-Neelsen staining of the sputum revealed tubercle bacilli. The specific gravity of the urine was 1028; no abnormal constituents were present. Wassermann and Kahn tests applied to the blood yielded negative results. Ziehl-Neelsen staining of material from a nasal swab revealed tubercle bacilli.

On October 12 his general condition was slightly improved, whilst the facial inflammation was approximately the same, both in extent and in the intensity of the inflammatory changes. Several swellings had appeared in the neck, on both sides, in the anterior triangles and in the submandibular regions; these swellings were fluctuant, painless and larger on the left side. The condition was considered to be acute adenitis, probably tuberculous. Three days later the swellings were distinctly larger, and glands of the right parotid region and in the left posterior triangle were found to be similarly affected. "Promin" jelly was applied as a dressing to the affected area of the face twice a day.

On October 17 Dr. W. Williams examined the ear, nose and throat region, and reported the presence of tuberculous ulceration of the tonsils and faucial pillars, tuberculous involvement of the soft tissues of the nose and adjacent parts of the face, and cervical and submaxillary adenitis. The larynx was not seen.

For the next three days there was some deterioration in the patient's general condition. The temperature remained in about the same range, but the pulse rate was higher (about 120 per minute). The patient complained of soreness

of the nose, the upper lip and the throat. He had some difficulty with respiration, respirations numbering about 24 per minute. The glandular swellings were not so great, but were now tender. The nose was more swollen, and there was a fluctuant area on the right side, opposite the level of the lower (free) edge of the nasal bone. Local and symptomatic treatment was continued, but "Promin" jelly was replaced by "Vaseline".

On October 22 the patient's general condition was poor; his temperature range was unchanged, and his pulse rate was about 130 per minute. The patient complained of dysphagia and dyspnoea, and breathing was obviously stertorous. Swelling of the face was less pronounced, but the nose was greatly swollen, with superficial ulceration at the anterior end. The glandular swellings were about the same, those on the left side being slightly smaller. Figure I shows the appearance of the face at this stage



FIGURE I.

of the disease, three weeks after the patient's admission to hospital and nine weeks from the onset. The chest findings were unchanged throughout. The result of the Mantoux test was strongly positive when 0.0001 gramme of old tuberculin was used.

For the next three days his condition rapidly became worse, with aggravation of all the symptoms. The appearance of his face changed but little, but respiratory embarrassment was evident. On October 25, after a restless night, the patient became irrational and very irritable, and was controlled with sedatives. Later, he developed Cheyne-Stokes breathing with cyanosis and dyspnoea, and death occurred during the morning.

Autopsy Findings.

In the upper part of the respiratory tract erythematous swelling with ulceration of the upper lip, the nose and the surrounding facial tissues was present, extending to the lateral orbital margin (the right more than the left) and into the visible area of the nasal mucosa. The appearance was similar in the pharynx and the soft palate; the area extended to the hard palate, shallow ulceration being more evident on the right side.

In the larynx gross irregular swelling of the epiglottis was seen, with ulceration of the mucous membrane and destruction of cartilage. Similar changes involved the whole of the laryngeal tissues, rendering recognition of the separate parts of the glottic area well nigh impossible.

There was gross enlargement of the submandibular, cervical and pretracheal glands, with caseation and supuration, extending into the cervical tissues generally.

Fine pleural adhesions were present over both lungs, with denser bands posteriorly. In the right lung were small areas of dark pigmentation, from one-eighth to one-quarter of an inch in diameter, scattered generally and most dense in the lower lobe. There was a small area of dense fibro-

cavernous infiltration at the extreme apex, and fine bronchopneumonic infiltration was present throughout the remainder of the lung, densest in the upper lobe. In the left lung the changes in the upper lobe were similar to those in the upper lobe of the right lung, but in the lower lobe congestion only was found.

Of the abdominal viscera, the only gross abnormality was seen in the small intestine, there being a small area of ulceration (two ulcers) tuberculous in type in the terminal portion of the ileum.

Small portions of the lung, liver, spleen and kidney, taken at random, were submitted to microscopic examination, and the report was as follows:

Sections through the liver and spleen show a few young tubercles scattered through these organs. None were seen in the renal tissue. This is the type of lesion that has often been observed at the post-mortem examination of patients who have died from tuberculosis in some other systems or organs.

Sections through the lung show a rather peculiar picture. There are only very few tubercles to be seen and they seem associated with some foci of lymphatic tissue. The predominant lesion is a purulent bronchitis and often leucocytic infiltration spread into the peribronchial tissue. The peribronchial infiltrations are mainly found in the interstitia, not in the alveoli.

From the sections, it seems certain that the patient did not die from miliary tuberculosis. All the lesions observed are terminal in character.

Discussion.

The incidence of gross tuberculous infection of the upper portion of the respiratory tract in association with pulmonary tuberculosis, as recorded in the literature, varies to a surprising extent. In a previous communication to this journal I reported a series of 121 cases of pulmonary tuberculosis in which autopsy was performed, and of which tuberculous infection was recognized in the pharynx and larynx in 22%.⁽¹⁾ In the same article Willis reported 150 cases in which the larynx and trachea were infected demonstrably in only 6%. Writers in current textbooks agree as to the relative rarity of infection of the nose and naso-pharynx, and as to the association of tuberculosis of the larynx and tuberculosis of the lungs. In his monograph Myerson⁽¹⁾ notes that tuberculous infections of the nose are, if external, tumefactions, abscesses or fistulae, and if internal, ulcerations, granulomata or ulcero-granulomata. He states further that "these lesions are secondary to distant foci, and with rare exceptions are the result of hæmatogenous spread of the disease". On the other hand Hollander and Szanto,⁽²⁾ in an article on tuberculosis of the naso-pharynx, reviewing a series of 24 fatal cases, make the following statement:

Tuberculosis of the nasopharynx occurs in the course of pulmonary tuberculosis, according to our experience, probably more frequently than tuberculosis of the larynx—75% in this series. Pathological process is generally an ulcerative lesion on the posterior part of the roof, and the upper part of the posterior wall. Nasopharyngeal tuberculosis may be primary or secondary. Infection by the hæmatogenous route is of rare occurrence. There may be an obscure focus in the nasopharynx, which remains as an active source of reinfection, after the pulmonary process becomes arrested.

A rare case of tuberculoma of the nose in a patient suffering from pulmonary tuberculosis is reported by Sciuto and Alonso.⁽⁴⁾ The condition ran a chronic course and was treated by local extirpation. These authors state that "tuberculomata form more than 2% of all tumours of the nose—implantation in the nasal region results from traumatism, generally made by the finger".

It would appear, therefore, that opinions differ as to the mode of infection, the lesions being considered either blood-borne from the original focus or produced by direct spread along mucous membrane. The possibility that the primary focus may be the nose or naso-pharynx, spread to the lungs occurring either by the air passages or by the blood-stream, should not be overlooked; but the pathological changes at the apices of the lungs in the case here reported were presumably of such duration as to make this unlikely. However, the limited degree of involvement of the lungs is worthy of note, and draws attention to the naso-pharyngeal passages, including the Eustachian tubes

and the maxillary sinuses, as a potential reservoir of infection and reinfection, especially in those patients whose pulmonary lesion is apparently quiescent or healed, but whose sputum persistently contains tubercle bacilli.

When this case is reviewed the conclusion is that the patient died from toxæmia with attrition due to starvation, and terminal asphyxia caused by the infection in the upper part of the respiratory tract. The pulmonary lesion was relatively limited in extent and of no great severity, and the microscopic findings do not indicate miliary spread. The nasal disease may have been precipitated by the trauma of inhalations on an area of mucous membrane already inoculated with tubercle bacilli, with subsequent activation of the tuberculous process and secondary pyogenic infection.

Summary.

1. A case is reported of tuberculosis of the nose and the upper part of the respiratory tract in a man suffering from pulmonary tuberculosis.

2. The rarity of the association is noted and the possible mode of infection is discussed.

3. The possibility that the naso-pharynx and its associated passages may be a potential reservoir of reinfection with tubercle bacilli is emphasized.

Acknowledgements.

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Reports of Cases.

FOUR CASES OF CARDITIS OCCURRING IN CHILDREN AND ASSOCIATED WITH THE ADMINISTRATION OF A FOREIGN SERUM.

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THERE is a rather close analogy between certain of the symptoms of rheumatic fever and those of serum sickness. Polyarthritides, fever, rashes and lymph gland enlargement may occur in both, differing as to frequency of occurrence and severity in the two diseases. In view of the present theory regarding the aetiology of rheumatic fever, that the disease may be akin to an allergic reaction, a hypersensitivity to the hæmolytic streptococcus group A, one is tempted to pursue more closely the analogy between these two diseases.

The real danger in rheumatic fever lies in the damage done to the heart, and this is not ordinarily a feature of serum sickness. However, there are at least two cases on record in which changes were noted in the heart of patients suffering from the latter disease.

In 1940 Wadsworth and Brown⁽¹⁾ reported acute carditis in a boy, aged eleven years, following the injection of five millilitres of tetanus antitoxin. He had no previous

history of tonsillitis or of rheumatic fever, and developed an acute reaction the day after injection. The next day he had a pronounced rash, and signs of acute myocarditis⁽²⁾ were found. There was a rubbing of the first mitral sound, and the electrocardiographic changes were consistent with the diagnosis. Two months later this boy had all the signs of active rheumatic carditis, and he still had a systolic murmur six months later.

Fox and Messeloff,⁽³⁾ in 1942, reported a second case of electrocardiographic changes following serum sickness. This patient, a male, aged eighteen years, gave a pronounced reaction to the skin test dose of tetanus antitoxin. A rash developed two days after the injection and was accompanied by fever, oedema and adenopathy. No murmur was heard in the heart, but the blood pressure was too low to be recorded, and electrocardiographic tracings showed lowering of the QRS complex and a slightly raised S-T interval. This patient showed improvement within five days.

From the pathological viewpoint, Clarke and Kaplan⁽⁴⁾ in 1937 discovered at post-mortem examination of two patients, who died after receiving large doses of anti-pneumococcal serum, a form of myocarditis which they likened to that found in animals following experimental anaphylaxis. Later, in 1938, Clarke⁽⁵⁾ reported a further case of myocarditis following a large dose of antiserum, this time concentrated horse serum, in a boy with acute anterior poliomyelitis. This boy developed an erythematous rash and adenopathy six days after the injection and died the following day. Clarke⁽⁵⁾ found a diffuse infiltration of histiocytes and oedema in the subendocardial and connective tissue of the heart, accompanied by focal infiltration between the muscle fibres. He believed these changes to be due to serum sickness.

Experimentally it has been shown by Rich and Gregory⁽⁶⁾ that lesions may be produced in the hearts of rabbits by artificially induced serum sickness, and that these lesions are found to resemble very closely those of rheumatic carditis.

The following four cases may be of interest. They all have in common the development of polyarthritides, fever, raised blood sedimentation rate and carditis (judged only on clinical findings) following the injection of a foreign serum. In the last three cases serum sickness occurred in the interval between the serum injection and the discovery of carditis.

Case I.

A male patient, aged four and a half years, was admitted to the Royal Alexandra Hospital for Children on August 18, 1945, with the following history. Listlessness and occasional intermittent pains in the left leg had been noticed for three weeks. On August 18 he was bitten on the leg by a dog, and was given an injection of tetanus antiserum. The next day he complained of a sore throat on rising, and on the following night he awakened from his sleep with pain in the left leg, and later he also complained of stiffness in the back and neck. He had had no previous attack of tonsillitis or of rheumatic fever, and there was no family history of this condition.

On his admission to hospital the boy looked ill. His temperature was 100° F. and his pulse rate 120 per minute. His left leg was held flexed at the hip and knee, and there was pain on movement of these joints, but no swelling. The tonsils were found to be enlarged, but not inflamed. The heart was enlarged slightly to the left, and a blowing systolic murmur was audible medial to the apex. A month later the heart was recorded as being of normal size, but the murmur was still present. The blood sedimentation rate on August 22 was 12 millimetres in the first hour and 25 millimetres in the second; on September 10 the rate was 4.0 millimetres in the first hour and 9.0 in the second. The patient was given 10 grains of sodium salicylate every four hours for three weeks; his temperature remained elevated for only one day. He was discharged from hospital on October 20.

For the first six months after leaving hospital he was pale and suffered from frequent attacks of pyrexia and occasional joint pains. Two years after the attack he is well and his heart is normal.

Case II.

A female patient, aged eleven years, was admitted to the Royal Alexandra Hospital for Children on March 13, 1939, with the following history. One week prior to her admission to hospital the patient had been given an injection because her sister was suffering from diphtheria. Four days later she had come out in "hives" and was feverish. The day before her admission to hospital she had begun to complain of pains in the left leg and arm, and of nausea.

On examination of the patient, her temperature was found to be 105° F., and her pulse rate was 120 per minute. The joints were swollen, hot and tender. Follicular tonsillitis was present. The apex beat was found in the fifth left intercostal space three and three-quarter inches to the left of the mid-line, and a mitral systolic murmur was audible at the apex. The blood sedimentation rate on her admission to hospital was 22 millimetres in the first hour and 40 millimetres in the second.

The patient was treated with salicylates, and her temperature returned to normal within two days. However, she left hospital against medical advice after one week, and no further record of her progress could be obtained.

Case III.

A female patient, aged five years, was admitted to the Royal Alexandra Hospital for Children on November 22, 1945, with the following history. One week previously the patient had been given an injection of tetanus antiserum after receiving a cut on the leg. Four or five days later she developed an urticarial rash and received a "needle" (presumably adrenaline). During the twenty-four hours before her admission to hospital she complained of sore legs and hands and was feverish. This patient had not suffered from tonsillitis, nor had she had any previous attacks of joint pain, and there was no family history of rheumatic fever.

On examination, the patient was found to be flushed, and to have a temperature of 101° F. and a pulse rate of 120 per minute. Pain was felt on movement of both lower limbs, and the fauces were slightly injected. There was no detectable cardiac enlargement, but a systolic murmur was heard at the apex. The blood sedimentation rate on November 24 was 67 millimetres in the first hour and 103 millimetres in the second. On December 7 these figures had fallen to 5.0 millimetres in the first hour and 17 millimetres in the second. A blood count on November 23 gave the following information: the red blood cells numbered 4,230,000 per cubic millimetre, the haemoglobin value was 13.2 grammes per centum, and the leucocytes numbered 10,200 per cubic millimetre, 79% being neutrophilic cells, 15% lymphocytes, 5% monocytes and 5% eosinophilic cells. This patient settled down well with salicylate treatment, the temperature remaining normal after one week. She was discharged from hospital on December 16, and has been well since; but a faint mitral systolic murmur was still audible eighteen months after her illness.

Case IV.

A male patient, aged four years, was admitted to the Royal Alexandra Hospital for Children on January 8, 1947, with the following history. He had been well until one week previously when, after what was believed to be an insect bite, he was given tetanus antiserum. He developed widespread urticaria three days later, for which he was given adrenaline. Two days after this he complained of aches and pains in the back and under the arms, was feverish and had general malaise and vomiting. He had suffered no previous attacks of tonsillitis or rheumatic fever, nor was there any family history of the latter condition.

On his admission to hospital, the patient was found to be a pale young boy with a temperature of 102° F. and a pulse rate of 120 per minute. Pain was felt on movement of the knees and the ankles. The tonsils were present, but not enlarged or inflamed. The apex beat was in the fourth left intercostal space, just outside the mid-clavicular line, and there was a pronounced mitral systolic murmur with accentuation of the second pulmonary sound. The blood sedimentation rate on January 10 was found to be 14 millimetres in the first hour and 35 millimetres in the second. On February 21 the figures were 11 millimetres in the first hour and 22 millimetres in the second. At a blood count on January 10 the red blood cells numbered 4,020,000 per cubic millimetre, the haemoglobin value was 11.0 grammes per centum and the leucocytes numbered 7300 per cubic millimetre, 57% being neutrophile cells, 37% lymphocytes, 7% monocytes and 5% eosinophile cells.

The patient was given 10 grains of sodium salicylate every four hours and the symptoms were rapidly relieved, the temperature returning to normal within three days and the heart findings being reduced to normal limits in ten. The murmur was still audible after five months, though its intensity was considerably lessened.

Discussion.

In Case I there was no evidence to suggest that serum sickness followed the injection, and from the history one would assume that the accident and the injection of a foreign serum may have precipitated an attack in a boy apparently suffering from subacute rheumatism.

The information with regard to Case II is incomplete. No statement is made regarding the exact nature of the injection which the patient received; it is only assumed that it was diphtheria antiserum, and that the subsequent skin eruption was due to serum sickness. Moreover, in view of the follicular tonsillitis discovered on the patient's admission to hospital, one is forced to argue that a streptococcal infection may have been a precipitating factor in the attack.

With regard to the other two cases, the nature of the illness would appear to be open for debate. It is well within the bounds of possibility that these children suffered an attack of rheumatic fever in which the "Phase 1" infection passed unnoticed, and that the serum sickness (which developed more quickly than usual after serum injection) was purely coincidental. This is especially so in view of the fact that the administration of tetanus antiserum is a fairly common procedure, and that these four cases were selected from over a thousand histories of rheumatic fever investigated.

A second explanation is that given by Wadsworth and Brown,¹ who, in discussing their case of carditis, pointed out that "there is much to favour the assumption that carditis may have been reactivation of subclinical rheumatic fever by protein shock". Certainly these children appeared to be in good health up till the administration of serum; but even so, it is not impossible that rheumatic fever, which can be extremely insidious, could have been present and have passed entirely unnoticed.

Lastly, one would venture to put forward the possibility that in the last two cases there was no preceding infection, no true rheumatic fever, but that there was some antigen-antibody reaction, set in train by the injection of tetanus antiserum, and that this produced an illness so closely simulating rheumatic fever, even to the extent of carditis, that it was impossible clinically to differentiate the two conditions.

Acknowledgements.

The material for these cases was obtained while I was at the Royal Alexandra Hospital for Children as Sister Sanders Scholar (University of Sydney). I wish to express my thanks to Dr. R. A. R. Green and Dr. Clifton Walker for their kind permission to publish these case histories.

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- ¹G. H. Wadsworth and C. H. Brown: "Serum Reaction Complicated by Acute Carditis", *Journal of Pediatrics*, Volume XVII, 1940, page 89.

²T. J. Fox and C. R. Messeloff: "Electrocardiographic Changes in a Case of Serum Sickness due to Tetanus Antitoxin", *New York State Journal of Medicine*, Volume XLII, 1942, page 152.

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⁴E. Clarke: "Serum Carditis: The Morphologic Cardiac Alteration in Man Associated with Serum Sickness", *The Journal of the American Medical Association*, Volume CX, 1938, page 1988.

⁵A. R. Rich and J. E. Gregory: "Experimental Evidence that Lesions with Basic Characteristics of Rheumatic Carditis Can Result from Anaphylactic Hypersensitivity", *Bulletin of the Johns Hopkins Hospital*, Volume LXXIII, 1943, page 237.

Reviews.

PENICILLIN TREATMENT.

It is just a year since the first edition of the very useful pamphlet, "Practical Points in Penicillin Treatment", by G. E. Beaumont and K. N. V. Palmer, appeared. In the second edition¹ the authors have made, as stated in the preface, "certain additions in accordance with the advances in our knowledge of penicillin treatment". Recent graduates will find many useful hints herein, while more senior physicians will also find a comprehensive digest of the subject well presented by two well-known authors. In discussing the treatment of syphilis, the writers state that whilst the results are very encouraging, yet "it is too early to state finally the place penicillin occupies in the treatment of syphilis". All the various methods of using the drug are clearly described and a very useful list of microorganisms upon which the drug has no effect is tabulated. This is certainly a very effective booklet and it can be recommended confidently to all practising doctors.

THE PATHOLOGY OF LABOUR.

The second edition of "The Pathology of Labour: The Puerperium and the Newborn" has just been published.²

The book is based on the seasoned clinical experience gained by the author, Charles O. McCormick, in his capacity of Clinical Professor of Obstetrics, Indiana University School of Medicine, and of consulting obstetrician to the W. H. Coleman and other hospitals.

From the outset one is impressed by the sincerity of the author in his efforts to teach obstetricians how to become fully qualified to look after the expectant mother, and so ultimately to reduce the overall maternal and neonatal morbidity and mortality rates.

The text is clearly and concisely presented, and is devoid of all padding. The print is easy to read, but great concentration is needed, as every line contains interesting material. Numerous drawings and photographs throughout the book add to the interest and help to clarify the subject matter. There are also many references to current American medical literature, and these references are interspersed throughout the text, rather than being given at the end of each chapter. This encourages one to note the references rather than to turn over to the next page, as is so often done.

In dealing with any particular abnormality, the author not only states his own treatment, but gives the treatment adopted in other American hospitals; there usually follows a comment as to the advisability or otherwise of adopting a certain procedure. The reader thus obtains a balanced outlook helped by the choice of the author.

Clinical "gems" appear regularly throughout the text, such as: "The rapid growth of fibroids always suggests pregnancy." "When using ovum forceps, twist in the long axis of the uterus before withdrawing." "When applying forceps articulate the blades and hold them for a moment before the patient in the position they will occupy when applied."

¹"Practical Points in Penicillin Treatment", by G. E. Beaumont, D.M. (Oxford), F.R.C.P. (London), and K. N. V. Palmer, M.B. (Cantab.), M.R.C.P. (London); Second Edition; 1947. London: J. and A. Churchill, Limited. 7½" x 4½", pp. 20. Price: 1s. 6d.

²"A Textbook on Pathology of Labour: The Puerperium and the Newborn", by Charles O. McCormick, A.B., M.D., F.A.C.S.; Second Edition; 1947. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9½" x 6½", pp. 534, with many illustrations, some of them coloured. Price: 64s.

"Large headed fathers have large headed babies." "With the exception of morphia and its derivatives, when giving analgesics in labour, disregard the station of the head or the dilatation of the cervix; regard only the amount of maternal discomfort."

Several sections of the book stand out as being exceptionally good, such as those dealing with pelvic deformities and their classification; trial labour; Ahlfield's method of measuring the fetus; the treatment of *placenta prævia* (particularly valuable for its many references); the special points in applying forceps; the indications for Cæsarean section; classification, aetiology, prophylaxis and treatment of puerperal infections; puerperal mental disorders; the use of heparin and "Dicumarol"; diseases of neonates, especially those associated with the Rh factor and syphilis; early post-partum ambulation.

The general interest of the book is increased by the fact that several important subjects have been placed in a class by themselves to emphasize their magnitude. Heart disease in pregnancy and labour, diabetes, eclampsia, and analgesics in labour have been thus treated.

Some of the treatments given in the text are not generally advocated in our teaching centres. For instance: internal podalic version in occipito-posterior cases; administration of ergot in *abruptio placentæ*; the routine use of douches after the tenth day of the puerperium; intravenous use of magnesium sulphate in eclampsia; *paracentesis abdominis* in the treatment of hydramnios; repeated attempts to express the placenta by Credé's method.

No mention is made in the book of the use of litmus in helping to detect doubtful rupture of the membranes, of the use of local anaesthesia in breech deliveries, of Milne-Murray or Neville-Barnes forceps, of anuria following concealed accidental hæmorrhage, of cerebral oedema as a cause of foetal death following Cæsarean section, of the use of bone forceps in performing circumcision.

Towards the end of the book is a very helpful section dealing with religious requirements and restrictions.

The text closes with seventy-five obstetric aphorisms which are well worthy of note and in keeping with the rest of the subject matter.

To those who are interested in becoming proficient in the art of obstetrics, this book is well worth the time it takes to read it.

GYNÆCOLOGY AND FEMALE UROLOGY.

"GYNÆCOLOGY INCLUDING FEMALE UROLOGY" by Lawrence Wharton is a meritorious work, made more valuable by the urological section, added to in this, the second edition.¹

The brief historical summary included in most of the sections is an unusual feature and provides an interesting background to the more valuable clinical facts which follow.

The author emphasizes the variability in strength and thickness of the endopelvic fascia, a fact which most of us have established from experience, but which is not often enough underlined in textbooks, and rather bewilders the beginner in his attempts at reconstructive vaginal plastic surgery.

The section on embryology and congenital malformations is very well done, particularly in regard to the urinary system. Discussing the development of the vagina, the author favours the views of Koff (whose diagrams he reproduces), which indicate that the upper portion of the canal is formed from the Müllerian ducts and only the lower sixth from the urogenital sinus; and also that the stratified epithelium of the vagina and cervix develops primarily as a solid core proliferating upwards from the point of union between these ducts and the urogenital sinus.

In regard to endocrinology, the conception of interplay between the various members of the ductless gland team, although not a new one, is again emphasized; the complexity of the problem is indicated and the way is pointed to a critical appreciation of progress and fresh knowledge in this field. Consistent with his healthy outlook is the author's conservative evaluation of endocrine treatment generally.

The author adds his weight to the fight against uterine malignant disease by stating, *inter alia*, that "in every case of abnormal bleeding or any menstrual disorder in an adult

woman, the first problem is to establish an exact diagnosis and eliminate the possibility of malignancy". This, of course, tells us nothing new, but it is a point that must continue to be laboured until the tragedies of omission cease to exist.

The advocacy of cervical cauterization *plus* supracervical hysterectomy as an alternative to total hysterectomy immediately raises an everlastingly debatable point and many would say that, if the cervix is sufficiently diseased to warrant pre-operative biopsy and/or cautery treatment, then anything short of the total operation is not radical enough.

On the precancerous significance of cervical leucoplakia the author has an open mind, which seems to be the reasonable view. At the same time, and even conceding that every carcinoma must pass through such a stage, many will object to his use of the term "non-invasive" carcinoma of the cervix, for which he claims clinical recognition. It must be admitted, however, that he certainly makes out a good case to justify his attitude here.

The section on carcinoma of the cervix is very comprehensive and particularly well done, and the author does well to draw attention to the pitfalls associated with the estimation of the extent of involvement, the usual tendency being, as he says, to underestimate this. As to treatment, he has a well-balanced outlook, and his appreciation of the relative merits of irradiation and surgery is both sound and impartial, for he concludes that all phases of this problem "are still wide open". His earnest and repeated pleas for routine periodic pelvic examinations will be echoed universally.

The endocrine imbalance theory of primary dysmenorrhœa receives scant support, although as theories go it seems plausible enough.

The section dealing with the anatomy of the hypogastric plexus is very well done, but details are lacking of the technique of alcohol injection of the spinal cord, and no mention is made of the intrathecal use of ammonium sulphate.

The author's stages of uterine prolapse are confusing. It is, however, pleasing to see that he takes a common-sense view of that very contentious subject of uterine retroversion, including its relation to sterility.

The section on ovarian tumours is disappointing, and although the classification of these neoplasms is proverbially difficult, one has seen simpler and more practical presentations than the one given. The subclass "potentially malignant" cystadenomata seems redundant.

The author falls into line with the general trend of modern thought by ascribing quite differing modes of development to the two forms of endometriosis, internal endometriosis or adenomyosis and external or pelvic endometriosis.

The complexity of the sterility problem is well shown and recent work is included on the fertility potential of normal spermatozoa and the penetrability of cervical secretions.

The enlarged section on female urology more than justifies the space devoted to it. Much valuable information is imparted, and this feature is probably the book's greatest asset from the viewpoint of the practising gynecologist. The urinary and reproductive organs originate in the same primordia and the close parallelism in their development is reflected in their anatomical proximity, their overlapping blood and lymph supply and innervation, and the frequent association of abnormalities. Small wonder is it then that the two systems are often mutually involved by dysfunction and disease. Hence the gynecologist must have more than a passing knowledge of the physiology and pathology of the female urinary tract, and he must constantly think in terms of the "genito-urinary" system.

The chapter on irradiation could with advantage have included more detail about treatment routines, dosages *et cetera*, and the relevant indications and contraindications applicable to each condition. The remarks on the irradiation of uterine fibromyoma, for example, are far too sketchy to be of any real help to the clinician.

Generally speaking, the book's chief value is as a reference for students rather than for practising gynecologists, although in many places, owing to the lack of that certain necessary leavening of dogma, even the student is left with nothing tangible "to hang his hat on" for purely academic examination purposes. In an attempt to make the work as comprehensive as possible, much detail has been incorporated, with some inevitable loss of true perspective in places and thereby a tendency to confuse the issue to the uninitiated. However, the book contains a wealth of information very systematically presented, and has much to commend it; but, with the exception of the section on female urology, it will be more valuable to the student and young house surgeon than to the more experienced graduate.

¹ "Gynecology with a Section on Female Urology", by Lawrence R. Wharton, Ph.B., M.D.; Second Edition; 1947. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9½" x 6½", pp. 1048, with many illustrations. Price: 70s.

The Medical Journal of Australia

SATURDAY, MARCH 13, 1948.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE PLEBISCITE OF THE PROFESSION IN ENGLAND AND WHAT IT MEANS.

As last week's issue of this journal was going to press the results of the British Medical Association's plebiscite in Great Britain in regard to service under the *National Health Service Act* were received. The announcement that was published was a bare statement of the totals covering replies to three sets of questions. The results were so amazing and such a complete vindication of the Association's attitude and actions that we cannot be content with last week's statement, nor is it fair to expect members to wait for further details until copies of the *British Medical Journal* reach Australia by ordinary surface mail.

Those who are not familiar with the events that preceded the taking of the plebiscite will find enlightenment in the London Letter from our special representative, published in the issue of February 28, 1948, at page 282. The following five "milestones" leading to the plebiscite are described. In the first place there were discussions between a negotiating committee and three successive Ministers of Health about the form and scope of a comprehensive medical service. Secondly came the placing on the Statute Book late in 1946 of the *National Health Service Act*. The third milestone was a plebiscite held in November, 1946, and covering the whole profession in which a majority vote was cast against the continuance of negotiations on the rules and regulations necessary to make the Act workable on the grounds that the Act violated a number of vital principles. The fourth event was the unexpected intervention of the Presidents of the three Royal Colleges as a result of which negotiations were resumed on the understanding with the Minister that amending legislation was not excluded. The fifth happening was the publication, first, of the profession's case as presented by the Negotiating Committee, and then of the Minister's reply. The aspects of the Act to which medical practitioners object are summarized as follows: (a) payment partly by basic salary and partly by capitation fee, the relative proportions to be settled by the

Minister; (b) "negative direction" of unplaced and new doctors as to where they shall practise; (c) denial of right of appeal to the Courts in case of dismissal from the service; (d) abolition of the buying and selling of practices; (e) uncertainty about the conditions governing present partnerships after July 5, 1948; (f) the intended drawing up of lists by a committee setting out which practitioners are to be entitled to practise midwifery. Our representative in the United Kingdom draws attention to the peculiar fact that (a), (b) and (c) that have been mentioned are not in the Bill that is being considered by the Parliament of Northern Ireland and that the provision dealing with midwifery does not appear in the Scottish Act.

As was mentioned in last week's statement, the first question asked (Section A) had to do with approval or disapproval of the Act in its present form. The total number who expressed disapproval was 40,814 and of those who approved 4735. General practitioners (principals) who disapproved numbered 15,303 and 1413 approved. Disapproval was expressed by 4087 consultants or specialists not holding whole-time salaried posts, and 269 approved. The most remarkable feature of this section is the disapproval of those who hold whole-time salaried appointments, governmental and non-governmental. Some persons might have expected a majority of these practitioners to favour the Act. Of those in whole-time governmental service 634 disapproved and 127 approved; of those in whole-time public health service 1928 disapproved and 316 approved; of those engaged in whole-time local authority special hospital service 813 disapproved and 174 approved; of those in whole-time local authority general hospital service 1171 disapproved and 217 approved; of those in whole-time voluntary hospital service 3425 disapproved and 467 approved. "Assistant" general practitioners were much the same—2323 disapproved and 306 approved. Even whole-time research workers disapproved to the number of 220 and 104 approved. Of whole-time teachers 424 disapproved and 110 approved. Of those in "other whole-time non-Government posts" 413 disapproved and 53 approved. Not much intelligence is needed to form a conclusion that there must be serious defects in the Act when it cannot win more adherents than are revealed by these figures. Last week we recorded the numbers, of those not in favour of accepting service under the Act in its present form—25,340, and of those in favour of so doing—4084. When these numbers are dissected the number of those "not in favour" is in every group overwhelmingly greater than of those "in favour". Thus, for consultants or specialists not holding whole-time salaried posts the numbers are 3975 and 406; for consultants or specialists holding whole-time salaried posts the numbers are 1094 and 565; for general practitioners (principals) the numbers are 14,814 and 2085; for general practitioners (assistants) they are 2223 and 415; for those in whole-time hospital service 3234 and 613. The figures in the third section were stated last week as 24,066 who agreed to abide by the decision of the majority and 4494 who did not so agree. When these figures are dissected into the groups mentioned for the previous section, the numbers of those who agreed were in each group in much the same proportion as the totals indicate.

The result of the plebiscite shows several things. First of all it shows not only that the medical profession is opposed to the Act in its present form, but also that it is united in this opposition. Secondly it shows that the Council of the British Medical Association and the Representative Body are in fact representative of the profession as a whole. Another fact made clear is that the younger men are behind the Council of the parent body. Again it is clear that the issue is not political, as has been stated by the Minister and by some of the newspapers. The final, and perhaps the most important, result of the plebiscite is that the Minister now knows what he has to meet. Unfortunately the dispute in Great Britain has taken on a certain personal aspect, and the blame for this must be credited to the Minister. He has referred to the British Medical Association as "a clique", as "not representative of the profession", as "political" and as "raucous-voiced". Some of the leading newspapers have in the past been opposed to the attitude adopted by the Association and already have appeared to regard the position in a more sober and accurate fashion. It is to be expected that the Minister will at least see that the use of unnecessary epithets will profit him not at all. The representatives of the Association have avoided the use of offensive epithets and have shown commendable dignity.

What will happen next is not clear. The Association will hold a Representative Meeting on March 17; in the meantime the result of the plebiscite must have a heartening effect on members of the profession. It has been said that the Minister intends to ask the members of the general public before long to choose a doctor under the Act. If this move is to be a test of the stability and determination of the members of the medical profession it will be seen in its true light. The positions of the Minister and of the profession are clear and there are indications that the general public—the third party in this triangle—is being brought to a proper understanding. Lord Horder wrote a telling statement which was published in *The Sunday Times* of February 22, 1948. He stated that only partisan spirit and a complete misunderstanding of the British Medical Association could dispose of the result of the plebiscite as being due to the dominance of the medical profession by a politically influenced caucus. He quoted Sidney and Beatrice Webb as describing the British Medical Association in their "Fabian Report on Professional Associations" as "one of the most highly developed and most efficient of all British professional organizations" whose constitution included "all the devices of advanced democracy". Lord Horder also referred to the Minister's statement in the House of Commons that he regarded the British Medical Association as "a small body of raucous-voiced people alleged to represent the profession". Lord Horder then added: "The public must judge which is the more appropriate description, and thus make its own assessment as to the value of the figures revealed by a vote of the profession." He then made a constructive suggestion. He pointed out that the Government, the profession and the people wanted a comprehensive health scheme and he thought that goodwill and statesmanship could prevail. To this end he stated that the Prime Minister, who had taken no active part in the recent debate, should intervene.

The Spectator has also suggested that "the Prime Minister may reasonably be expected to take a hand in conjunction with the Minister of Health at the new negotiations which events make inevitable". The paper also observed that "reasonable compromise is not beyond attainment and it must be attempted without delay". *The Times*, which has always been more on the side of the Minister than of the profession, has admitted that the Minister must give due weight to "this remarkable expression of the doctors' feelings". It thinks that the results of the plebiscite inevitably require the British Medical Association to make the next move. At this distance we may be content that the Representative Meeting of March 17 will take what steps it thinks fit after full and careful consideration of all the facts and their implications. It is, of course, of the utmost importance that the public should understand the full significance of all that is done. Some important letters and statements have been published and it should, we imagine, be possible for the average citizen to be informed if he so desires. The importance to Australian practitioners of all these happenings in Great Britain is, or should be, obvious.

Current Comment.

ERYTHEMA NODOSUM.

At first sight it may not seem that anything fresh can be said about *erythema nodosum*. We have passed through dogmatic days when it was regarded as a rheumatic complaint, and others when it was considered as a sinister warning of active tuberculosis, but the general view is now that it is a manifestation of sensitivity to a number of agents, the most important of which are streptococcal infections and tuberculosis. The occasional appearance of this eruptive phenomenon during a course of treatment with a sulphonamide drug has aroused the wonder if this is due to the toxic effects of the drug *per se* or to a provocative action on the organism being attacked. C. B. Favour and M. C. Sosman have published the results of an inquiry into *erythema nodosum* in which 155 patients were followed up over periods ranging from one to twenty years.¹ The interests of the writers are respectively medical and radiological, which is helpful, owing to the importance of the pulmonary pathology associated with some attacks. They think that the classification of *erythema nodosum* as one of the sensitivity diseases, if indeed it can be called a disease at all, has tended to obscure its relationship to streptococcal infections, and that too much has been made of its connexion with tuberculous infection. There is, of course, no doubt that it is a special reaction of certain tissues to a number of selective agents.

The patients studied by the authors were observed in two hospitals during the last thirty years, most of them being actually seen in the last ten years. The majority were females, the proportion rising after the age of puberty, as has been found by others. In over 80% of the patients a known respiratory infection preceded the onset of the *erythema nodosum* by a period of from two to four weeks. In four patients only was there clinical evidence of active tuberculosis present at the time. The only constant physical finding in all patients, as might be expected, was the presence of the eruption. Very common was the association with the attack of pain of swelling and sometimes redness and effusion in multiple joints; this sometimes preceded and sometimes followed the eruption. Next most common was the occurrence of a respiratory infection; nearly half the patients had enlarged

¹ *Archives of Internal Medicine*, October, 1947.

glands in the neck caused by an infection of the throat. Only six patients were known to have rheumatic fever before the onset of the *erythema nodosum*, and one child suffered from an active carditis which began during the course of the skin lesion. During the last five years cultures have been obtained from the throats of all the patients seen, and skin tests to streptococci have also been made. From nearly half the patients β haemolytic streptococci have been grown and the majority of a series of these patients who were tested for streptococcal sensitivity showed a general and local reaction. Most of the others who showed local reaction without streptococci being grown from their throats had no sign of general systemic reaction. Tuberculin produced evidence of local sensitivity in 29 out of 61 patients who had shown some reaction to streptococci, but general reaction was produced in one instance only. Of particular interest were the radiological studies, for the problem here is to interpret the shadows seen in skiagrams of the chest. In all 65 patients were thus carefully examined. In 37 no abnormality was detected. In ten enlarged lymph nodes were detected, and in eighteen there were markings in the lung fields needing explanation. In two only were areas of infiltration considered to be due to tuberculosis, but no positive proof was obtained. It is in this group that follow-up investigations should be of particular importance, and there seems to be a field for further study. Thirty patients were followed for over a year with special regard to their pulmonary condition. In some instances the period of check was as long as 25 years, the average being five years. None of them showed any signs of tuberculosis or sarcoidosis, and such radiological appearances as had been observed at the time proved to be evanescent. The authors conclude that in their series associated respiratory infections accompanied the attacks in 80% of patients. They found tuberculosis an uncommon antecedent, and rheumatic heart disease a rare sequel. The frequency of a migratory polyarthritides was a common feature in the adults, and was seen in a third of the children. Such attacks recurred for months or years in one-tenth of the patients observed. The authors do not regard *erythema nodosum* as a form of rheumatic fever, but they point out that its association with streptococcal infections has been insufficiently emphasized in previous literature.

THE VIABILITY OF *TREPONEMA PALLIDUM*.

THE impression is quite common that *Treponema pallidum* is an excessively delicate organism which can survive for little more than negligible periods outside the animal body. This idea has not only fostered apparent difficulties in the transmission of specimens for diagnosis, but has in some cases led to a false sense of security in the handling of syphilitic material. C. E. Lumsden,¹ while working in Assam during the war, was faced with the problem of the reliability of material from penile sores which was sent to him for dark-ground examination from field hospitals and was for days in transit. Finding the available textbooks uninformative or conflicting, Lumsden carried out some investigations of his own. In ten consecutive cases of penile chancre in which *Treponema pallidum* had just been found, series of capillary tubes of serum were prepared, sealed and stored for subsequent examination. In eight cases in which the tubes were stored in an incubator at 37° C. (98.6° F.) *Treponema pallidum* remained viable at least six days. In one case, in which the tubes were stored at a room temperature of 5° to 18° C. (41° to 64.4° F.), *Treponema pallidum* remained viable for ten to fourteen days. In one case, in which the tube was not properly sealed, no spirochaetes could be identified on the tenth day. In a further eight cases the original slide preparations in which *Treponema pallidum* had been identified were sealed with soft paraffin and stored either at room temperature or in an incubator at 37° C. In each case *Treponema pallidum* was viable for eight to fourteen days. Viability was longer in the

slides kept at room temperature. In subsequent experiments Lumsden found motile *Treponema pallidum* persisting in slide preparations for as long as thirty-four days.

In discussing these findings Lumsden refers to the transmission of syphilis through necropsy material and through transfused blood. Several workers have reported the persistence of motile *Treponema pallidum* in necropsy material for over forty-eight hours. Accidental infection of persons working in the post-mortem room or in the laboratory has followed the handling of post-mortem material obtained from congenital syphilitic children or fetuses, from subjects with primary syphilis and from the brain of a subject with general paralysis. Lumsden then quotes the fairly recent reports of transmission of syphilis by transfusion of blood from people with primary and secondary syphilitic infections and also from those in the pre-chancere stage. Evidence suggests that the refrigeration of stored blood in a blood bank does not obviate this risk, though the likelihood of the transmission of syphilis by stored blood is not great in actual practice. From all this it appears that *Treponema pallidum* is not to be treated casually in any circumstances; it is always prepared to live up to its reputation as "the great deceiver".

MELBOURNE MEDICAL STUDENTS.

IN March, 1862, Dr. John Macadam, Melbourne's public analyst, began lecturing in chemistry to the first group of medical students of the seven-year-old university; the other first year subjects were Greek and Latin. The first professor, George Britton Halford, was appointed to the chair of anatomy, physiology and pathology, and delivered his inaugural lecture on May 1, 1863. In the following year the Melbourne Hospital "reluctantly admitted the third year students". Melbourne medical students were to experience many difficulties in obtaining their clinical training before the Melbourne Hospital became an effective and willing teaching hospital and, in view of the centenary celebrations of the Royal Melbourne Hospital, this is an appropriate time for the Melbourne Medical Students' Society to have published their booklet "The Melbourne Medical Students, 1862-1942".¹ This interesting historical account of student activity is, as is fitting, the work of a senior medical student, Bryan Gandevis, who is to be commended for his enterprise and for the readable way in which he has presented his material. It will certainly be attractive to present and former students of the medical school of the University of Melbourne and should command a much wider audience.

The Medical Students' Society came into formal existence in 1880, the first secretary being J. W. (later Sir James) Barrett, but there is evidence of a good deal of corporate activity before that year; groups met to read papers and to discuss literary and medical subjects, unsatisfactory aspects of teaching and accommodation were brought to the notice of the authorities, and other undergraduate activities of varying standards of fitness and wisdom were undertaken. The Medical Students' Society became a very active body and has played a significant part in the subsequent history of the school, advancing the interests of students and establishing itself in prestige and importance. It has organized sporting and social events and, not least, has published the journal *The Speculum* since 1884. *The Speculum* has reflected student life as in a mirror and has recorded events of contemporary and local interest, professional and serious topics and medico-political matters; in spite of occasional frowns and mutterings from Olympus, the journal has fulfilled a useful purpose. Gandevis has found its columns a treasure trove and many will thank him for bringing this and much other treasure to the light.

¹ "The Melbourne Medical Students, 1862-1942, Being a Review of their Numerous Activities, with a Summary of the History of the Medical School and a List of Office-bearers in the M.S.S." by Bryan Gandevis; 1948. Published by the Melbourne Medical Students' Society and obtainable from the honorary secretary of the Society at the Royal Melbourne Hospital, Parkville, Victoria. 8½" x 5½". Price: 3s. 6d. (plus postage 1½d.).

¹ *The Lancet*, December 6, 1947.

Abstracts from Medical Literature.

MEDICINE.

Amyl Nitrite for Severe Hiccup.

R. C. NAIRN (*The Lancet*, June 14, 1947) found that immediate relief followed the inhalation of amyl nitrite, after other remedies had failed, by a patient who had suffered from severe hiccup for nearly four days.

Clicking Pneumothorax.

A. P. THOMSON (*The Lancet*, May 10, 1947) describes several cases in which a rhythmic clicking sound, heard by the patient and referred to the back of the throat or to the chest, was the leading symptom of a small spontaneous pneumothorax. The clicking is synchronous with the pulse of the heart. It occurs only when the pneumothorax is on the left side and small, a mere bubble of air, at the periphery of which there is a viscous adhesion between the visceral and parietal layers of the pleura. Each beat of the heart causes a slight separation of the adhesion, which is the cause of the clicking sound.

Chickenpox with Pneumonia and Nephritis.

CHARLES E. GRAYSON AND ELIZABETH J. BRADLEY (*The Journal of the American Medical Association*, August 9, 1947) report a case of chickenpox in an adult in whom pneumonia developed early in his illness and nephritis on the twenty-eighth day. The pneumonia caused severe cyanosis and dyspnoea, râles and rhonchi audible over the entire chest, density in the form of finely nodular infiltrations throughout both lung fields in the X-ray film, fever for more than a week, but no leucocytosis. There was no response to sulphonamides and penicillin. No significant bacteria could be isolated from the blood or sputum. The nephritis occurred on the twenty-eighth day and caused only slight albuminuria and hematuria without other evidence of illness. The authors consider this a case of disseminated chickenpox. They review a few similar cases that have been reported in the literature.

Thyreotoxic Crises.

J. W. MCARTHUR, R. W. RAWSON AND O. COPE (*The Journal of the American Medical Association*, July 5, 1947) describe 36 thyreoid crises or storms among 1383 patients who underwent operation and 650 medical patients not operated upon. There were 25 crises among surgical patients and 11 among medical patients. The average age was forty-eight years; 27 women were affected and nine men. About equal numbers of patients had toxic diffuse goitre and toxic nodular goitre. All patients had a basal metabolic rate of +50% to +70%. Twenty-three of the patients had heart disease and thirteen had congestive heart failure. Acute toxic psychosis was an ominous sign. The form of therapy which preceded the thyreoid crisis (including no therapy, iodine, X rays, quinine and sedation) did not prevent the onset. Withdrawal of iodine therapy appeared to precipitate the crisis in several patients. A warning symptom occurred

in all patients. The crises occurred always in very "toxic" patients and were often precipitated by operation, pneumonia and various forms of trauma. Prolonged treatment with thioracil before operation is suggested as the best method of preventing a crisis. Operation during a severe toxic stage associated with a high basal metabolic rate and poor gain in weight is dangerous; therapy with thioracil should be continued for up to eight weeks if necessary. Few of the patients referred to by the authors had thioracil treatment since most of these crises occurred before the drug was introduced.

Sprue.

D. ODLEBERG AND J. SCHEIN (*The Journal of the American Medical Association*, August 23, 1947) describe clinical and pathological studies in sprue. The essential findings were deficient absorption of fat, fat-soluble vitamins and some carbohydrates. Weight loss, anaemia (usually hyperchromic and macrocytic), painful lesions of mouth and tongue, and sometimes steatorrhea occurred. Hypocalcaemia, tetany, osteoporosis, pigmentation, vitamin deficiencies, hypoproteinaemia and liver damage might occur. Thirty-six patients had "primary" sprue, without organic intestinal lesions. The ages of these ranged from sixteen to seventy-three years. Twenty-nine patients contracted the disease in the United States of America and seven in the tropics. A diet with high protein, low fat content with moderate amounts of carbohydrates was prescribed. Large amounts of vitamins, especially the B complex, liver by the parenteral route and folic acid were given. Eight patients died and 27 responded to treatment very well. Four patients with secondary sprue had abnormalities of the small intestine of the sprue type. They all responded poorly to treatment. Folic acid in doses of 15 to 30 milligrammes per day given by mouth yielded results comparable to liver therapy, but no better so far as could be determined.

Pulmonary Embolism.

J. CARLOTTI, I. B. HARDY, R. R. LINTON AND P. D. WHITE (*The Journal of the American Medical Association*, August 23, 1947) discuss pulmonary embolism in medical patients. Pulmonary embolism arose from phlebitis of veins of the legs in 95% of cases investigated except in cardiac disease. Pulmonary embolism often followed surgical operations, but more frequently it occurred in association with medical conditions. In 122 cases of pulmonary embolism there were 52 deaths. Nearly 85% of patients were over forty years of age. Half of the medical patients had heart disease. Symptoms were chest pain, dyspnoea and haemoptysis, frequently with a rise of temperature and pulse rate. Râles, dullness, faint breath sounds and, rarely, a friction rub were the main signs. X-ray examination often made the diagnosis clear and certain changes in the electrocardiogram were said to be diagnostic at times. Post-mortem examination revealed massive embolism in 50% of patients, but in only twelve were mural thrombi found in either chamber of the heart. In 75% thrombosis of the veins of the leg was found. For treatment the authors suggest bilateral interruption of the femoral veins when pulmonary embolism is suspected, especially in

cardiac conditions. Apparently this operation has been performed after the occurrence of pulmonary embolism. The interruption should be made distal to the sapheno-femoral junction; otherwise persistent oedema of the lower limb will develop. Furthermore, the interruption should be proximal to the profunda femoris vein.

Poliomyelitis.

THE Minnesota Poliomyelitis Research Commission (*The Journal of the American Medical Association*, June 28, 1947) has reported that 23% of children with poliomyelitis suffered involvement of the brain stem in recent epidemics in Minnesota. Ocular palsies, weakness of jaw muscles, facial nerve palsy, vertigo and vomiting and nystagmus occurred without much threat to life, but involvement of the tenth, eleventh or twelfth nerves was liable to affect swallowing. Nasal speech, hoarseness, stridor, weakness of tongue, salivation and especially difficulty in swallowing occurred. With tenth nerve paralysis occlusion of the airway was likely to occur, necessitating special measures to maintain an airway. Involvement of the respiratory centre was indicated by irregularities in depth and rhythm of breathing. Inflammatory foci in the ventral reticular substance were found in such cases. Involvement of the circulatory centre induced a cherry red colour of the lips, flushed face, a pulse with a rate of 150 to 200 per minute and often irregular in rhythm, low blood pressure and low pulse pressure (down to ten millimetres of mercury). Inflammation on the dorsal reticular substance was observed in these cases, suggesting that this is an important vasomotor centre. The vagal nuclei were usually intact. Anxiety, tremor, twitchings, insomnia, confusion, lethargy and coma occurred in diffuse encephalitis. Fixed ideas and hallucinations were noted. Only a few patients had inflammatory changes in the cerebral hemispheres. The cerebral symptoms were often relieved by oxygen. Focal cerebral lesions were revealed occasionally by aphasia, agnosia, convulsions, myoclonic jerks, spastic hemiparesis and ataxia. Involvement of the cervical and thoracic portions of the spinal cord caused failure of the diaphragm and intercostal muscles, and necessitated treatment in the respirator. Many of these patients died, with post-mortem evidence of pulmonary oedema, bronchopneumonia, atelectasis and pulmonary abscess.

Thrombosis.

E. V. ALLEN (*The Journal of the American Medical Association*, September 6, 1947) discusses emergency treatment in vascular occlusions. He states that the use of anticoagulant agents in acute myocardial infarction is well established, though final evaluation must await experience. Heparin and "Dicumarol" are integral parts of the treatment of acute venous and arterial occlusion. Heparin acts rapidly and can be given intravenously every four hours in 50-milligramme doses; combined with gelatin, dextrose and glacial acetic acid it can be administered beneath the skin and then only every second or third day as it is absorbed slowly. It costs about £3 a day. It can cause haemorrhages, which can be controlled by protamine given intravenously (50 milligrammes) or blood transfusion. "Dicumarol" is cheap and

can be given by mouth. If it causes hemorrhage this can be alleviated by intravenous administration of vitamin K or by blood transfusion. It should not be given without reliable laboratory control. Pulmonary embolism is the main danger from venous thrombosis. Out of 329 cases of pulmonary embolism observed at the Mayo Clinic subsequent venous thrombosis or pulmonary embolism was anticipated in 144, with death in 60 cases. It is stated that as a result of therapy with heparin or "Dicumarol", the actual number of pulmonary emboli or venous thromboses was three, and the number of deaths one.

The Effect of Nicotine on the Circulation.

MARGARET N. BOYLE *et alii* (*American Heart Journal*, July, 1947) administered intravenous injections of nicotine bitartrate to 46 subjects in a dose corresponding to the amount of nicotine calculated to be absorbed on inhaling the smoke of a cigarette five times in one minute. Twenty of the subjects were known to have coronary heart disease. Significant changes were observed in the electrocardiogram of four of these. In the case of two, who suffered from spontaneous anginal attacks, pain was associated with the appearance of the electrocardiographic changes. The authors concluded that in some patients with coronary heart disease the injection of nicotine induces a state of coronary insufficiency.

Tobacco Angina.

J. M. BRYANT AND J. E. WOOD, JUNIOR (*American Heart Journal*, July, 1947), made electrocardiograms from sixteen patients who were subject to paroxysmal cardiac pain, in each case while the patient was smoking cigarettes of the brand to which he was accustomed. One instance of pure tobacco angina was discovered. In another instance the pain was precipitated by exertion as well as by tobacco. Neither patient had suspected that his symptoms were in any way related to smoking. It appeared that coronary spasm induced by smoking was the cause of the anginal seizures not related to exertion. The authors suggest that the use of tobacco may play a more important role in determining the symptoms of coronary arterial disease than has been realized in the past.

The Problem of Venous Thrombosis.

THOMAS B. AYCOCK AND JAMES W. HENDRICK (*The Journal of the American Medical Association*, April 26, 1947) discuss the problem of venous thrombosis. They differentiate and describe in detail the etiology, clinical manifestations, prophylaxis and treatment of phlebotrombosis and of thrombophlebitis. Clinical notes of cases from their observed series are presented. The technique of thrombectomy and ligation of the superficial femoral vein is described. The authors state that venous thrombosis is a frequent complication, and is seen in both medical and surgical patients. It occurs more frequently in the later age groups, and is more prone to develop in patients with cancer, cardiac diseases, serious infections, disease of the peripheral veins, blood dyscrasias and trauma. In phlebotrombosis the thrombosis commonly develops first in the plantar veins and in the calf veins, and then propagates itself into the deep veins of the

thigh and pelvis. Pulmonary embolism is a frequent complication. Thrombophlebitis completely occludes the vein and usually begins in the deep veins of the thigh and pelvis; pulmonary emboli are infrequent, but a painful oedematous leg often results unless appropriate treatment is administered early. Thrombectomy and ligation of the affected vein above the thrombus is the rational treatment for phlebotrombosis. Blocking of the sympathetic ganglions with procaine hydrochloride and monobromo-saligenin ("Bromsalizol") effects a cure in thrombo-phlebitis.

Lipoid Nephrosis.

PAUL NICAUD (*Le presse médicale*, August 9, 1947) discusses the cure of lipoid nephrosis and describes two in which recovery occurred. It is known that diet with a high meat content and thyroid gland in large doses can cure lipoid nephrosis, as was demonstrated by Epstein many years ago. The first patient presented a complete picture of lipoid nephrosis: chronic generalized oedema with albuminuria and typical blood chemistry with low protein, high cholesterol, and high total lipid content of the serum. He was treated with large doses of thyroid and given a diet daily containing 200 grammes of protein in the form of meat, fish, haricots, peas and lentils, and 20 to 40 grammes of fat. In six months the patient had returned to normal. The second patient, who had the same symptoms and signs, did not respond to protein and thyroid, until he developed acute abdominal pain with vomiting which led to a diagnosis of acute peritonitis. He recovered from this, and within a few days his oedema left him; in a few weeks he was completely restored to normal. This recovery following an acute infection is not unusual in lipoid nephrosis.

Desensitization to Penicillin.

S. M. PECK, S. SEGAL AND R. BERGAMINI (*The Journal of the American Medical Association*, August 30, 1947) report successful desensitization in penicillin sensitivity. The reactions to penicillin are varied and mainly allergic. They may simulate serum sickness, or may be local or general erythema, often with vesicular eruptions. Febrile reactions without skin eruptions often follow aerosol inhalation and bronchial instillation. In the case recorded a man, aged sixty-three years, with oedema of the larynx and acute respiratory distress, was treated with penicillin in doses of 220,000 units a day. On the third day he developed an erythematous and vesicular eruption on the hands, feet and groin, which spread all over the body. This gradually subsided over a period of one month. Later, after operation, the use of penicillin was indicated again. An intradermal test with 2000 units of crystalline penicillin in 0.1 millilitre of normal saline solution yielded a positive result. Desensitization was begun with a similar dose which yielded a "four plus" reaction in forty-eight hours. After this penicillin was injected subcutaneously three times a week with an initial dose of 400 units of non-crystalline penicillin and the doubling of each subsequent dose up to a maximum of 12,000 units. In three weeks twelve desensitizing doses were given. Four days later a skin test with 2000 units of crystalline penicillin in 0.1 millilitre of normal saline solu-

tion yielded very little reaction. After this doses of 5000, 10,000 and 30,000 units of commercial penicillin were given intramuscularly at intervals of six to twelve hours without ill effect. Then 30,000 units were given every three hours. There was a mild erythema after four doses; penicillin was suspended for one day, then doses of 10,000 units three hourly for two days, 15,000 units three hourly for two days, and 30,000 units three hourly for seventeen days were given without adverse reaction.

Sleep and Uræmia.

LEO HESS (*The Journal of Nervous and Mental Disease*, August, 1947) points out that uræmia is characterized by a host of vagal signs and symptoms. Miosis due to parasympathetic irritation occurs. Salivation is an early sign. Rhythmic bradycardia is associated with vagal irritation. Hyperhidrosis is common due to increased parasympathetic impulses. The gastrointestinal tract is hyperactive, an indication of increased activity of the parasympathetic nerves. Respiratory disturbances include orthopnoea, Kussmaul's type of deep breathing as in acidosis, or Cheyne-Stokes respiration. Hypothermia and pallor are typical of the uræmic patient. Somnolence is a central sign. The author attempts to account for all of the vegetative disturbances through one factor by assuming an irritation by the uræmic poison at a certain area in the diencephalon. It is the area for the centres of heat and osmoregulation, the centre of the vegetative nervous system. It is assumed that it is located close to the centre for sleep mechanism.

Myasthenia Gravis.

H. R. VIETS (*The Journal of the American Medical Association*, July 19, 1947) has reviewed 175 cases of myasthenia gravis with particular reference to dysphagia. The disease usually begins between the ages of twenty and thirty years, but may occur at any age. Ptosis, diplopia, weakness of arms, legs or neck muscles occur most frequently, but dysphagia or dysarthria occurs in 20% of cases. In order to differentiate dysphagia due to myasthenia from dysphagia due to other causes, a test dose of neostigmine methyl-sulphate 1.5 milligrammes and 0.6 milligramme of atropine sulphate is injected, and the rate of swallowing of barium paste is observed radiologically. In myasthenia the injection causes an increase in the swallowing rate and changes in the muscular movements of deglutition, whereas in other causes of dysphagia no such effects are observed.

The Partial Maturation of Leucæmic Myeloblasts following Fresh Plasma Transfusions.

JOSEPH L. SCHWIND (*The American Journal of the Medical Sciences*, February, 1947) reports that fresh plasma transfusions resulted in the partial maturation of myeloblasts in two cases of acute myeloblastic leucæmia. The author states that the results of other authors with whole blood transfusions are thus confirmed. It is found that fresh plasma will cause the partial maturation of leucæmic myeloblasts *in vivo* as well as *in vitro*. The substance causing the maturation is not present in the γ globulin fraction of blood plasma or in dried plasma.

Bibliography of Scientific and Industrial Reports.

THE RESULTS OF WAR-TIME RESEARCH.

During the war a great deal of research was carried out under the auspices of the Allied Governments. It has been decided to release for general use a large proportion of the results of this research, together with information taken from former enemy countries as a form of reparations. With this end in view, the United States Department of Commerce, through its Publication Board, is making a weekly issue of abstracts of reports in the form of a "Bibliography of Scientific and Industrial Reports". This bibliography is now being received in Australia, and relevant extracts are reproduced hereunder.

Copies of the original reports may be obtained in two ways: (a) Microfilm or photostat copies may be purchased from the United States through the Council for Scientific and Industrial Research Information Service. Those desiring to avail themselves of this service should send the Australian equivalent of the net quoted United States price to the Council for Scientific and Industrial Research Information Service, 425, St. Kilda Road, Melbourne, S.C.2, and quote the PB number, author's name, and the subject of the abstract. All other charges will be borne by the Council for Scientific and Industrial Research. (b) The reports referenced with an E number may be obtained in approved cases without cost on application to the Secondary Industries Division of the Ministry of Post-War Reconstruction, Wentworth House, 203, Collins Street, Melbourne, C.I. Copies of these are available for reference in public libraries.

Further information on subjects covered in the reports and kindred subjects may be obtained by approaching the Council for Scientific and Industrial Research Information Service, the Secondary Industries Division of the Ministry of Post-War Reconstruction, or the Munitions Supply Laboratories (Technical Information Section), Maribyrnong, Victoria.

PB M 40462. GIBBS, FREDERIC A. Electroencephalographic selection of air force personnel. Monthly progress report, Nos. 1-6. August, 1942, to April, 1943. 8 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

This project was sponsored by the Committee on Medical Research of the Office of Scientific Research and Development under contract number OEM cmr-167. Previous electroencephalographic studies led to the assumption that epilepsy in either its clinical or subclinical form can be detected with some degree of accuracy. Analysis of the data of 150 schizophrenics indicates that even in severe schizophrenia the electroencephalogram is essentially normal. The electroencephalograms of 1000 student fliers were classified according to age. The distribution in each age group is shown in a table and accords with the observation that from infancy to late adult life the electrical activity of the cortex increases in frequency with increasing age. For 375 men between 21 and 25 years the right occipital spectra were obtained by analysing the electroencephalogram with the Grass frequency analyser. At present electroencephalography has no practical value for the prediction of failure in primary or basic training. For abstract of final report see PB 40461.

PB M 60927. GOLDIN, ABRAHAM. On the neurological effect of some chlorinated tertiary amines. No date. 1 p. Price: Microfilm, \$1.00; Photostat, \$1.00.

This brief report describes the effect of intraperitoneal injection of β -chloroethyl morpholine and β -chloroethyl dimethyl amine in albino mice as demonstrated in a ten-minute film. These drugs induce a neurological syndrome which resembles the behaviour of Waltzer and Shaker strains of mice. This symptom pattern is not elicited by β -hydroxyethyl morpholine or by morpholine. The document covers work performed by personnel of the Medical Division, Edgewood Arsenal, Maryland.

PB M 49648. GUYTON, ARTHUR C. A versatile square wave nerve stimulator. October, 1945. 12 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

With the help of a diagram the electrical design of a square wave stimulator with an extreme range of voltage, duration, and frequency of stimuli is described. The stimulator is coupled directly to the electrodes, thereby preventing distortion of the square wave. This stimulator

has proved to be extremely useful in both quantitative and qualitative neurophysiological work.

PB M 53078. GUYTON, ARTHUR C., AND MACDONALD, MARSHALL A. The physiology of botulinus toxin. 1944-1945. 49 pp. Price: Microfilm, \$1.00; Photostat, \$4.00.

These studies were conducted at Camp Detrick, Maryland. By elimination of both the nerve trunk and the muscle as sites of action for botulinus poisoning the toxin seems to have its primary action at or near the myoneural junction. Elongation of the synapse time in botulinus poisoning indicates allocatal action at this point. Botulinus poisoning affects the vagus nerve just as it affects skeletal nerves. It also causes a peripheral circulatory failure. Other studies were devoted to the influence of antitoxin and to the histopathology of the poisoned end plates. It is postulated that botulinus toxin causes its effect on the end plate by a specific, destructive chemical reaction between a component of the end plate and the protein molecule of the toxin. Clinical treatment of a poisoned patient would appear to depend almost wholly on the immediate use of massive quantities of antitoxin; however, the use of a respirator and of vasopressor drugs may be of value in saving the life of a patient who has received a barely lethal dose of toxin. A bibliography of fifteen items, three tables and four figures are attached.

PB M 51044. HADLEY, PHILIP B. Effect of inhalations of penicillin aerosol on pneumococcus pneumonia in rats. Final and summarizing report. July, 1946. 27 pp. Price: Microfilm, \$1.00; Photostat, \$2.00.

The following four phases of the study are summarized: (i) the effect of penicillin aerosol on experimental pneumococcus pneumonia in rats; (ii) penicillin concentration of blood serum and lungs of rats, following inhalational and parenteral administration of the drug; (iii) the effect of streptomycin aerosol on Friedländer pneumonia in rats; and (iv) the effect of penicillin aerosol on mustard-gassed rats. The various conditions of the experiments, doses and methods used, and results obtained in the course of this study are restated in this report. Six tables and one chart are attached.

PB M 49622. HARVEY, A. M., et alii. A test programme on the physiological actions of DFP in normal individuals and in patients with myasthenia gravis. Final report. July, 1946. 98 pp. Price: Microfilm, \$2.00; Photostat, \$7.00.

This report contains the results of clinical, physiological and chemical studies on di-isopropylfluorophosphate (DFP) executed in the Department of Medicine, Johns Hopkins University, from July, 1945, to July, 1946. Observations in 92 human subjects are recorded, ten of whom were suffering from myasthenia gravis. The plasma and red blood cell cholinesterase activity of forty non-myasthenic and twelve myasthenic subjects was studied prior to the administration of DFP. DFP, which has up to the present and in the doses used been shown to have no action other than the ability to irreversibly inhibit cholinesterase, produced a definite pattern of symptoms referable to the central nervous system which was accompanied by detectable changes in the electrical activity of the brain. It did not favourably compare with neostigmine in the relief of weakness in patients with myasthenia gravis. Experiments on the effect of DFP on intestinal motility and on the sensitivity of the intestine to neostigmine and pitressin indicate that DFP may prove to be a useful adjunct in the treatment of paralytic ileus. A bibliography of 25 items, 16 graphs and 17 tables are included.

PB M 53079. HOTTEL, G. A., AND ABRAMS, A. Detoxification of purified botulinum type A toxin. 1945-1946. 12 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

This study was conducted at Camp Detrick, Frederick, Maryland. Some experiments are reported covering the detoxification of purified crystalline botulinum Type A toxin with formaldehyde and the antigenicity of the resulting toxoids in mice. The most active preparation had one component electrophoretically and was antigenic in mice in a dose containing 0.01% of toxoid nitrogen, 2400 times more active than crude toxoid. A bibliography of eight items is attached.

PB M 53081. HOTTEL, G. A., et alii. Studies on botulinum toxoid, types A and B. II. Methods for determining antigenicity in animals. 1944-1945. 20 pp. Price: Microfilm, \$1.00; Photostat, \$2.00.

The work reported in this document was divided into two phases, the first of which involved the assay of routine preparations of alum-precipitated toxoid. The second phase consisted of developing a method for measuring the antigenicity of purified toxoids. The method used involved immunization with alum precipitates of dilutions of fluid toxoid in Bactocra's amino acid solution. A marked difference was found in the antigenic response of mice to fluid and to alum-precipitated botulinum toxoid. One dose of fluid toxoid induced very little immunity in mice. Guinea-pigs developed

¹ Supplied by the Information Service of the Council for Scientific and Industrial Research.

immunity following single dose injections of fluid as well as of alum-precipitated botulinum toxoid, but considerable variation was found in the response of individual animals. A bibliography of nine items and six tables are attached.

PB M 53073. HOWE, CALDERON, AND MILLER, WINSTON R. Human glanders—a report of six cases. No date. 46 pp. Price: Microfilm, \$1.00; Photostat, \$4.00.

This study was carried out at the Station Hospital, Camp Detrick, Frederick, Maryland. Among personnel involved in laboratory research work with the organism *Malleomyces mallei* and *Malleomyces pseudomallei* (Whitmori), these six cases occurred within the space of one year. The diagnosis was confirmed by the high agglutinin titre and the mallein skin test. All six patients whose case histories are presented responded to treatment with sulphadiazine. A bibliography of fifteen items, six graphs and ten pictures (röntgenograms of the chest) are attached.

PB M 60691. JENKINS, DALE W. A laboratory method of rearing chiggers affecting man (Acarina: Trombiculidae). 1946. 22 pp. Price: Microfilm, \$1.00; Photostat, \$2.00.

The object of this research was to discover a method of rearing chiggers experimentally in the laboratory in order to provide colonies for the purpose of disease transmission studies of scrub typhus, and to provide chigger larvae for testing new acaricides and repellents under controlled laboratory conditions during the entire year. A second object was to obtain information about the little known but common pest species of chiggers affecting human beings in the United States. Using the laboratory methods and materials described in detail in the text, three generations have been reared of the chiggers which affect human beings in the United States: *Eutrombicula alfreddugesi*, *Eutrombicula mason*, and *Eutrombicula batatas*. A bibliography of eleven items and four plates are attached.

PB M 60690. KAREL, LEONARD, AND WESTON, RAYMOND E. Femoral arterial and venous blood nitrogen content of dogs during denitrogenation by continuous oxygen inhalation. No date. 1 p. Price: Microfilm, \$1.00; Photostat, \$1.00.

This is a one-page abstract in which the methods used and the results of statistical analysis (analysis of variance, mean values and standard errors) are summarized. The experiments were performed on anesthetized dogs continuously inhaling 99.6% oxygen through a tracheal cannula.

PB M 63834. KROP, STEPHEN. Effect of diisopropylfluorophosphate, diisopropylchlorophosphate, diisopropylphosphite and diisopropylphosphonate on the mechanical response of striated frog muscle. No date. 2 p. Price: Microfilm, \$1.00; Photostat, \$1.00.

This document indicates that the halogenated phosphate esters possess "curariform" properties demonstrable in isolated frog muscle in association with a reduction in muscle cholinesterase. The unhalogenated phosphate and phosphite esters did not exhibit these properties. This document, which appears to be an abstract of a report, is a contribution from the Medical Division, Edgewood Arsenal, Maryland.

PB M 53072. LANDAHL, H. D., AND BLACK, SIMON. Penetration of air-borne particulates through the human nose. No date. 15 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

This work was carried out at the Toxicity Laboratory, University of Chicago. In order to estimate the hazard involved in exposure to a dust or the therapeutic value of breathing some particulate material, the role of the nasal passages should be clarified. Experiments on the nasal penetration of particulates have been carried out on human subjects. Corn oil, sodium bicarbonate and calcium triphosphate have been used in the study in which particle size and flow rate through the nose have been varied. The results are presented in five tables and two graphs. A diagram of the apparatus used is included.

PB M 49649. ELLINGSON, HAROLD V., et alii. Cutaneous anthrax: A report of 25 cases. No date. 12 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

Observations on 25 cases of cutaneous anthrax are presented. *Bacillus anthracis* was isolated from blood cultures of three of these patients prior to treatment. All cases were treated with penicillin, in total dosages from approximately 1,000,000 units to over 4,000,000 units. Three patients also received sulphadiazine. In no case was *Bacillus anthracis* isolated from the blood after twenty-four hours or more of treatment. All patients recovered uneventfully.

PB M 49653. HECKLY, ROBERT J. A simple lyophilizing apparatus for laboratory use. No date. 15 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

Lyophilization is a term used to designate the removal of water from material in the frozen state—a form of sublimation. A simple lyophilizing apparatus which can be constructed easily from readily available materials is described. It is sturdy and compact for convenient manipulation, can handle up to 2500 millilitres of material, and is

economical in operation. The apparatus is readily adapted to accommodate various types and numbers of bottles or vials. A bibliography of nine items and two diagrams are attached.

PB M 49661. HILL, EDWIN V., AND CARLISLE, HAROLD. Toxicity of 2,4-dichlorophenoxyacetic acid for experimental animals. June, 1945. 35 pp. Price: Microfilm, \$1.00; Photostat, \$3.00.

The lethal doses (50% mortality) expressed in mg./kg. of 2,4-dichlorophenoxyacetic acid by mouth is 375 for mice, 666 for rats, 800 for rabbits and 1000 for guinea-pigs. The tolerated dose for these same species was 125, 166, 200 and 333 mg./kg. respectively. The largest dose administered to monkeys without serious after effects was 214 mg./kg. Subacute intoxication was produced in dogs by the daily administration of 25 mg./kg. over a six-day period with the development of liver damage. Guinea-pigs can tolerate one gramme of the material administered in divided doses of 100 milligrammes over a period of twelve days. A bibliography of six items is attached.

PB M 53084. MORGAN, HERBERT R., et alii. Studies on the cultivation of Japanese B encephalitis virus in eggs. June-September, 1945. 11 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

This study was conducted at Camp Detrick, Frederick, Maryland. It is indicated that the distribution of Japanese B encephalitis virus in embryonated eggs does not appear to be dependent upon a particular route of inoculation. The distribution of Japanese B encephalitis virus in eggs shows a definite pattern of maximum titre in the embryo, followed by the membrane, yolk-sac and allantoic fluid in descending order. The maximum growth of virus in the embryonated egg is produced by inoculation by the intraembryonic route. In eggs titrated after the same interval following inoculation, the virus content is higher in living embryos than in dead. Gross changes observed in the embryo are not correlated with virus content. Infected eggs can be refrigerated at least sixty hours without significant loss of virus content. A bibliography of three items, one graph and two tables are attached.

PB M 53077. LEWIS, KEITH H., AND HILL, EDWIN V. Practical media and control measures for producing highly toxic cultures of *Clostridium botulinum*, type A. 1943. 32 pp. Price: Microfilm, \$1.00; Photostat, \$3.00.

These studies were conducted at Camp Detrick, Frederick, Maryland. Practical liquid media, composed of readily available and relatively inexpensive ingredients, have been developed for the production of highly toxic cultures of the "Hall" strain of *Clostridium botulinum* (type A). The peptones usually employed in culture media can be replaced by casein or powdered skim milk. Clarified corn steep liquor can be used instead of yeast extract for toxin production. Additional use of commercial glucose ("Cerelease") is advantageous. A bibliography of fifteen items, seven tables and two sheets with graphs are attached.

PB M 60692. LIPTON, BARBARA S. Case report: Blocking of chemical decerebration by postle pathology. 1946. 10 pp. Price: Microfilm, \$1.00; Photostat, \$1.00.

This study was conducted at the Department of Psychiatry, University of Illinois College of Medicine, Illinois Neuropsychiatric Institute, Chicago. The case history of a forty-five-year-old white carpenter is presented who suffered from a lesion, possibly a telangiectasia in the tegmentum of the pons. Continuous electroencephalographic and electrocardiographic tracings after intravenous administration of NaCN were recorded and compared with the findings observed in other patients and animals. Clinically the patient responded with hyperpnea, short periods of apnea and loss of consciousness. However, at no level of intoxication did he show decerebrate rigidity.

PB M 53080. NIGG, CLARA, et alii. Studies on botulinum toxoid, types A and B. I. Production of alum-precipitated toxoids. 1943-1944. 30 pp. Price: Microfilm, \$1.00; Photostat, \$2.00.

Purpose of the investigation was to devise methods for the production of botulinum toxoid suitable for human inoculation. The basic medium to be suitable for the production of botulinum toxin was modified by a preliminary purification of the constituents ("Peptidase", corn steep liquor, dextrose) and by varying their respective concentrations, the emphasis being on the production of toxin with high Lf value rather than high toxicity. The final alum-precipitated toxoid had the appearance of a fine white flocculent precipitate. The production lots of twice concentrated 2% alum precipitated toxoid type A gave flocculation values which varied from 20 to 24 Lf per millilitre, while similar type B preparations obtained 15 to 20 Lf per millilitre. The alum-precipitated toxoids prepared as described in the document were found to have high antigenic value both in experimental animals and in man. A bibliography of nineteen items and six tables are attached.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on Thursday, October 30, 1947, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, Dr. A. C. THOMAS, the Past President, in the chair.

Surgery in Infants.

Dr. L. G. TAIT discussed some surgical conditions in young infants. He said that unless one was associated with a children's hospital or perhaps with a midwifery hospital, one perhaps did not realize how many congenital deformities occurred. When a baby was born, the doctor should examine the child carefully before telling the parents that the child was well. This examination should include the mouth, the perineum and the heart. It still happened that the doctor, after a cursory glance at the baby, handed it to the nursing staff, and on the second or third day he was told that the child was vomiting and that it had not passed meconium; then the doctor would discover an imperforate anus. Such babies were best operated upon within the first twenty-four hours after birth. Cases of penile and glandular hypospadias and cases of vaginal anus were commonly overlooked at first. This did not matter, except that it made it necessary for the doctor to modify his first report that the baby was well.

Dr. Tait went on to say that feeding troubles weeks or months after birth might reveal a partial cleft palate or an inefficient heart. Aseptic treatment of the umbilical cord should be the medical man's care. Pyæmia from an infected umbilicus was perhaps less serious since the advent of penicillin; but it should be avoided. Dr. Tait wondered how many doctors looked at the cord to make sure that it was being dressed carefully. The tendency seemed for the doctor to leave the care of the baby, its feeding and the dressing of the umbilicus and circumcision wound and so on entirely to the nurse. The doctor was probably in a hurry, and he did not wish to bother the busy nurse to undress the child and perhaps to wake it from sleep; but if he showed more direct interest in that way, it would be stimulating. Infected umbilical scars were very common and seemed to be almost disregarded. A case of that kind had occurred at the Royal Alexandra Hospital for Children, and twelve large abscesses developed, including one in the mediastinum from which one pint of pus was obtained. This child recovered with one ankylosed shoulder joint. Apart from the injury to the child, a bed in the hospital was occupied for six or seven weeks; both of these disadvantages should have been avoided. Dr. Tait said that two weeks prior to the meeting he examined a baby which had recently been discharged from a leading midwifery hospital with pus being discharged from both eyes and from the umbilicus and with severe stomatitis; the parents said that no comment had been made on the baby's condition when it was leaving the hospital.

Dr. Tait then discussed meconium ileus. He said that in this condition the intestine was blocked by meconium of putty-like consistency, owing to deficient pancreatic secretion. The baby vomited bile-stained fluid during the first few days after birth, and the abdomen became distended. Meconium might be present in the rectum, but was not passed to any extent. Dr. Tait said that he had seen several babies with this condition, and all had died from the obstruction. Referring to congenital malformations of the gall-bladder and bile ducts, Dr. Tait said that these were common. Laparotomy was necessary to discover the exact state of affairs and to see whether anything could be done. In this condition again operation should be performed in the early days, before destructive changes occurred in the liver from back pressure and metabolic disturbance. There might be no gall-bladder or ducts, or there might be a gall-bladder which contained fluid, but which did not collect bile from the liver, owing to the malformation, or because of destruction of liver substance. In a small proportion of these cases the block was due to inspissated mucus and bile—a condition said to be allied to meconium ileus. If the condition could not be rectified, the baby might live for eight months or longer, but naturally it would be very jaundiced. Eventually it would die from malnutrition or from infection. Various kinds of congenital obstruction of the alimentary tract were usually exactly diagnosed only at operation or at post-mortem examination. The bowel might be replaced by a fibrous cord at one or more places, or there might be a septum with a pin-point opening blocking the lumen of the bowel. Such defects were apt to

be multiple, and a careful gastro-enterostomy performed to cut out a deformed duodenum might fall owing to another block lower down.

Dr. Tait then went on to say that macroglossia was fortunately not common. When it was present feeding was a problem; but if the child survived the first year, by then he seemed to gain control of the tongue and more or less keep it inside the mouth. Dr. Tait had attended two patients with this condition in one family. One child survived an operation for congenital pyloric stenosis at four weeks. After its death at six months a post-mortem examination revealed other abnormalities, including cystic kidneys and obliterated mesenteric vein. Children suffering from hare-lip and cleft palate were not good operation "risks", and had a habit of suddenly dying after operation. Parents should be warned of this possibility. A baby with a hare-lip should be progressing before it was operated upon, and it should weigh at least eight pounds. Children with cleft palates were easier to operate upon when two years old and stood operation better. In both cases parents were anxious to have the operation over and the deformity corrected, and might urge operation at an earlier age.

Dr. Tait then referred to congenital pyloric stenosis. He said that after having operated upon about 400 of these babies he believed that their behaviour before operation grew more and more varied. If during the first two months after birth a baby vomited in projectile fashion often enough to delay its progress, and if waves of gastric peristalsis were visible right across the upper part of the abdomen, and if these manifestations did not disappear after regulation of feeding and management—then the baby might be regarded as suffering from congenital pyloric stenosis, and Ramstedt's operation should be carried out. Dr. Tait said that he had operated on 12 to 15 babies supposed to be suffering from congenital pyloric stenosis who proved not to have that condition at all; but evidently they had pyloric spasm due to unsuitable food or aerophagy. In these cases the muscle of the pyloric region showed no tumour, but was pale in colour, did not bleed on division and was of the same texture as was the tumour in a case of congenital pyloric stenosis. The behaviour of these babies improved after division of the pyloric muscle, though perhaps not so abruptly as in cases of congenital pyloric stenosis. One of these babies five months later developed achalasia of the oesophagus for which gastrostomy was required. The conclusion was that this pale, bloodless appearance and peculiar texture of the muscle would be seen in any case of continued spasm of a sphincter muscle of the alimentary tract. Dr. Tait said that he had had the opportunity in several cases of examining the pyloric region five to eight months after a Ramstedt operation had been performed for congenital pyloric stenosis. In each case the muscle of the pyloric region had the pink colour and soft texture that would be expected under normal conditions. A faint scar only remained where the tumour had been divided; no tumour could be seen.

Dr. R. B. C. STEVENSON, in opening the discussion, said that he had enjoyed the paper by Dr. Tait very much, and especially the manner in which a very vast subject had been so ably condensed. He said that in the space of a few minutes facts had been presented which represented the accumulated knowledge of years of experience. Sometimes the interest of a paper was lost in the amount of padding which accompanied the relevant detail. The paper was of great interest from the point of view of the obstetrician and gynaecologist, because early recognition of all types of congenital defects in infancy was essential. It was also necessary for the obstetrician and gynaecologist to know when to advise the parents to seek the aid of a paediatrician. Dr. Stevenson said there were several points on which he would like to hear greater detail. The first really concerned the paediatric physician rather than the paediatric surgeon, but Dr. Tait had said that the infant's heart should be listened to with a stethoscope shortly after birth. Dr. Stevenson understood that many congenital murmurs were not audible in the first two or three weeks of life. Another point was about exomphalos, a rather rare condition, but one which was sometimes encountered. He asked Dr. Tait whether operation should be performed immediately on these babies. The last point was the ideal time to operate on the various congenital herniæ. Dr. Stevenson said that he thought it was a good idea to have combined meetings of two different sections, at periodical intervals, as two completely different viewpoints were brought to bear on a subject of common interest. Dr. Stevenson thanked Dr. Tait for a very concentrated but interesting paper.

Dr. R. KENT BURNETT said that he would like to second Dr. Stevenson's remarks and to ask Dr. Tait about the condition of vaginal anus in infants and what was the best

time to attempt operation. The second point Dr. Burnett wished to raise was the percentage of success in the closure of meningocele and the best time to undertake it.

Dr. T. Y. NELSON said that he would like to thank the speaker for his interesting paper. Dr. Nelson was of the opinion that the treatment of most of the conditions of infancy had become standardized. There would be very few people who, like Dr. Tait, could get up and say that they had a series of four hundred cases of pyloric stenosis to their credit. It was to be hoped that some day Dr. Tait would publish this series, as in Dr. Nelson's opinion it would be found that Dr. Tait's mortality rate would compare more than favourably with those recorded in other parts of the world. Dr. Nelson said that the condition of the baby who vomited early in life presented a certain amount of difficulty in the diagnosis and usually resulted in laparotomy. It was possible to find a volvulus of an unattached gut which was amenable to surgical treatment, and Dr. Nelson thought it was important to know that some of these conditions were amenable to surgery. There was one condition which had not been mentioned, which constituted a challenge to the surgeon and which required the cooperation of the obstetrician if success was to be achieved, and that was the condition of tracheo-oesophageal fistula. In other parts of the world this had been treated successfully, but Dr. Nelson did not know of any successful reports in Australia. However, if the condition was recognized early and the proper measures were instituted, there was every prospect of success. One point was important, and that was that the baby vomited or regurgitated any fluid by mouth and became cyanotic, and if the condition was not recognized very early the baby would die of aspiration pneumonia. It was necessary to recognize the condition in the first twenty-four hours if there was to be any prospect of successful surgery, and that was where the obstetrician had an advantage over the paediatrician. If this condition was recognized, the particular abnormality could be confirmed by the passage of a catheter into the blind upper oesophageal pouch, and if a further confirmation was necessary by the instillation of a few drops of lipiodol into the oesophagus and subsequent X-ray examination. Barium, however, should not be used. The technical difficulties of the operation could be overcome; it was, however, not necessary to dwell on those, but merely to draw attention to this anomaly and to hope that opportunities would arise for dealing with it.

Dr. LORIMER DODS said that Dr. Nelson's remarks had stimulated him to say something about Gross's work on this problem of oesophageal atresia and tracheo-oesophageal fistula. Gross had emphasized the need for early diagnosis and operation and the value of passing a number 8 or 10 soft rubber catheter into the oesophagus of any newborn infant whose condition suggested the possibility of these anomalies. In most cases obstruction could be demonstrated by this simple procedure, in certain cases fluoroscopy might also be necessary, and one or two millilitres of lipiodol might be instilled in an attempt to outline the upper oesophageal pouch. Gross divided and closed the tracheo-oesophageal fistula and performed an end-to-end anastomosis of the oesophagus; a gastrostomy was performed the next day and the infant was fed by this route for the next ten days. Gross and Swenson, who had had a wide experience of this operation, recently reported 21 operations for this condition with only three "post-operative" deaths. Gross had stressed the fact that a plain X-ray examination was usually sufficient to confirm or deny a congenital obstruction of the alimentary tract; this examination should be made with the child in the prone and head-down position and should include both antero-posterior and lateral views which should show a dilated duodenum and distended loops of small intestine, if obstruction was present. The administration of barium represented an added insult to a disturbed and possibly obstructed alimentary tract and should be avoided if possible; if it was imperative to give barium it should be administered as a very thin gruel and gastric lavage should be performed as soon as possible after the X-ray examination. Neuhauser, radiologist to the Boston Children's Hospital, had emphasized the classical radiographic picture produced by the condition of meconium ileus; a plain X-ray examination would reveal a marked dilatation of the small intestine which did not end sharply in a point of obstruction, but in scattered bubbles of gas which extended through most of the distal portion of the small intestine. Treatment of this condition consisted in an early ileostomy followed by repeated irrigation with 1% solution of pancreatin and administration of the same solution by duodenal tube, although it was doubtful whether this use of pancreatin was very helpful. Ingraham, of Harvard, recommended that craniectomies of the appropriate

suture lines should be performed during the early weeks of life in cases of craniosynostosis. Successful treatment in these cases of premature synostosis had made earlier diagnosis imperative, and for this reason it was important to palpate the skull sutures of every newborn infant and to arrange for an X-ray examination if there was any suspicion of craniosynostosis. Dr. Dods said that he would like to congratulate Dr. Tait, whose wide knowledge of the newborn infant and particular interest in infant feeding and nutrition had helped him to achieve such outstanding surgical results in early infancy.

Dr. JOSEPH STEIGRAD also expressed his appreciation of Dr. Tait's paper. Dr. Steigrad said that he had been interested to hear Dr. Tait say that he had later on seen inside the abdomen of several babies who had been operated on for congenital pyloric stenosis, when he noticed that the tumour had disappeared and the pylorus had regained its normal rosy appearance.

Donovan, of the New York Babies Hospital, in a paper based on a series of 500 cases—a series comparable with Dr. Tait's—reported the interesting fact that Dr. Martha Walkstein, a pathologist, had had the opportunity to perform autopsy examinations on a number of patients who had had pyloric stenosis as infants and who had died later, many in adult life, from some other condition. She had observed that those who had been treated by the Ramstedt operation showed a fine pyloric scar, no tumour and a red pylorus, whereas those on whom a gastro-enterostomy—the earlier operation—had been done still showed the tumour. In other words, while the gastro-enterostomy was only palliative and gave relief, the Ramstedt operation apparently effected a cure.

Dr. NORMAN CUNNINGHAM thanked Dr. Tait for his remarks. Dr. Cunningham was glad that Dr. Nelson had raised the point of congenital oesophageal atresia, and wondered what Dr. Tait's operative experience had been in that condition. Dr. Cunningham also asked what Dr. Tait considered the secret of success, apart from operating within the first twenty-four hours of life. Dr. Dods had said that the knowledge of electrolytic imbalance, which had made great strides in America, was becoming appreciated in Australia; Dr. Cunningham wondered what Dr. Tait's experience had been in the intravenous use of serum, either as treatment for shock or as replacement therapy, and what quantities he used for newborn babies.

Dr. Tait, in reply to Dr. Stevenson, who had asked about heart murmurs in the first weeks, said that the murmurs from congenital heart defects should be audible from birth. Referring to exomphalos, Dr. Tait said that it should be operated on within the first twenty-four hours of life, partly for the sake of the condition of the child, partly to avoid infection. Referring to hernia, Dr. Tait said that inguinal hernia sometimes disappeared spontaneously owing to delayed closure of the *processus vaginalis*, so that it was best to delay operation for from three to six months. In umbilical hernia, unless the hernia was very large, operation was best delayed until the child was four or five years old, because such herniae sometimes disappeared. In vaginal anus, if no obstruction was present, it was best to delay operation until the child was old enough for the mother to know whether the child had control of the bowel or not. If she had control, it was best to leave the condition untouched, and the child could decide for herself later whether or not to undergo operative treatment. Referring to meningocele, Dr. Tait said that it was best operated on early, before it became infected. Dr. Cunningham had referred to oesophageal atresia. Dr. Tait said that he had had no experience with cases of congenital oesophageal atresia.

Dr. Thomas, from the chair, said that the meeting had been short but most enjoyable, and those present were grateful to Dr. Tait and to those who had joined in the discussion, for much had been learnt. Dr. Thomas hoped that the lessons learnt would be of some use in the future. The important point brought out by Dr. Tait was the need for a complete and thorough examination of the baby immediately after birth.

Public Health.

NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL: STREPTOMYCIN COMMITTEE.

THE Streptomycin Committee of the National Health and Medical Research Council held its second meeting in the School of Public Health and Tropical Medicine, University

of Sydney, on January 20, 1948, at 5 p.m. All members of the committee were present, namely, Dr. Cotter Harvey, Dr. A. W. Morrow, Dr. K. B. Noad, Dr. W. C. Sawers and Dr. H. W. Wunderly (convener).

Use of Streptomycin.

Its use is recommended in:

1. Tuberculous meningitis.
2. Acute hæmatogenous millary tuberculosis.
3. Tuberculous laryngitis and ulcerating lesions of the mucous membranes of the oro-pharynx.
4. Progressive ulcerating tuberculous lesions of the tracheo-bronchial tree. Parenteral treatment is essential and may be combined with aerosol therapy.
5. Pulmonary tuberculosis—recent extensive and progressing pulmonary lesions, especially if these are diffuse and finely disseminated. Tuberculous pneumonia should be treated with streptomycin.
6. Tuberculous draining cutaneous sinuses.

Its use is not recommended in: (a) chronic fibroid or fibro-caseous pulmonary tuberculosis; (b) acute destructive and apparently terminal types of pulmonary tuberculosis; (c) minimal or early moderately advanced pulmonary tuberculosis with favourable prognosis; (d) chronic tuberculous empyemata.

When larger stocks of streptomycin are available further trial is recommended in: (a) acute ulcerative tuberculous enteritis; (b) tuberculosis of the genito-urinary tract; (c) tuberculosis of bones and joints; (d) tuberculosis of the skin; (e) tuberculous adenitis without sinus formation; and (f) treatment of ocular tuberculosis.

Thoracic surgery. The committee recommends that its use as a prophylactic measure be continued in cases of pulmonary tuberculosis where resection is to be performed. More experience is necessary before it can be decided whether it should be used as a prophylactic treatment of all thoracoplasties. It should, however, continue to be used when "slipping chronics" are to be submitted to this operation.

The opinion of an American committee that "it may prove advisable to avoid prophylactic treatment and to confine use of the drug to cases in which spreads have actually occurred" was noted.

Its use is recommended in the following non-tuberculous conditions:

1. *Hæmophilus influenzae* meningitis and pneumonia.
2. Urinary tract infections, wound infections and bacteriæmias due to: (a) *Escherichia coli*, (b) *Bacillus proteus*, (c) *Pseudomonas aeruginosa*, (d) *Aerobacter aerogenes*.
3. Meningitis due to all Gram-negative bacilli.
4. Infections due to *Klebsiella pneumoniae*.
5. Plague, *Shigella* dysentery and tularemia.

The committee acknowledges the assistance it obtained from the report to the Council on Pharmacy and Chemistry published in *The Journal of the American Medical Association* of November 8, 1947, and from the annual report of the Committee on Therapy of the American Trudeau Society and its Subcommittee on Streptomycin Therapy published in the same number. The Council on Pharmacy and Chemistry published a further brief statement on streptomycin in *The Journal of the American Medical Association* on November 29, 1947 (see appendix).

Dosage of Streptomycin in Tuberculosis.

The fourth Streptomycin Conference was held at St. Louis on October 9 to October 12, 1947, and its recommendations relative to dosage were accepted by this committee and are contained in Recommendation 2.

Duration of Treatment.

The usual period of treatment is for 50 to 60 days, at which time the case should be reviewed. It is exceptional for treatment to be prolonged beyond 120 days.

State Streptomycin Committees and Central Streptomycin Bank.

The correspondence which had passed between the Department of Trade and Customs and the Department of Health was presented to the committee. An account was given of the steps that had been taken in the formation of State committees and the approach that had been made to the Repatriation Commission for permission to form a central bank at Concord. Appreciation was expressed of the cooperation offered by the Commission. After a lengthy discussion the committee decided that the recommendation would be for the location of the central bank of streptomycin

to be kept by the senior Commonwealth medical officer in Sydney, and when his branch is closed for supplies to be made available from the Royal Prince Alfred Hospital.

Applications for Streptomycin.—Applications should be made to the senior Commonwealth medical officer of the State and be accompanied by clinical notes and radiographs.

Recommendations.

Recommendation 1.

The committee recommends that while streptomycin is in short supply its use in any State be limited to the above-mentioned tuberculous and non-tuberculous conditions and that its use be not extended without reference to this committee.

Recommendation 2.

It is recommended that all types of tuberculosis, except millary and meningitic, in which streptomycin may be a useful adjunct, be treated with 1.0 gramme of streptomycin a day given in two doses of 0.5 gramme each at twelve-hour intervals by intramuscular injection; in acute millary tuberculosis and tuberculous meningitis intramuscular doses of 2.0 grammes or more a day, and in the latter instance the intrathecal injection of 50 milligrammes of streptomycin every one or two days.

While the committee felt that patients undergoing treatment with streptomycin should, as far as possible, be admitted to hospital, it would not make a recommendation to that effect because the doses are now small and complications very few.

Recommendation 3.

It is recommended that at the end of six weeks a progress report be sent to the State Committee, who shall advise as to whether treatment should be continued or not, and that at the completion of treatment full medical records, including X-ray films, be sent to the senior Commonwealth medical officer of the State concerned.

Recommendation 4.

That, with the exception of a small amount of streptomycin held by each senior Commonwealth medical officer for use in cases of influenzal meningitis, all streptomycin be held in a central bank, and that this bank be located in Sydney. Applications for supplies are to be made to the senior Commonwealth medical officer, Sydney, or, when his branch is closed, to the Royal Prince Alfred Hospital.

Recommendation 5.

That one hundred grammes of streptomycin be supplied to the senior Commonwealth medical officer in every State for the treatment of influenzal meningitis, and that this amount be kept at that level by necessary replacements from the central bank.

Recommendation 6.

That the recommendations of this committee, which have the approval of the National Health and Medical Research Council, be forwarded to the Editor of *THE MEDICAL JOURNAL OF AUSTRALIA* for early publication and to the members of the State streptomycin committees.

APPENDIX.

(*The Journal of the American Medical Association*, Volume CXXXV, Number 13, November 29, 1947.)

Streptomycin.

Effective In—

Many Gram-negative bacillary infections: Tularemia. *Hæmophilus influenzae* meningitis and pneumonia. Urinary tract infections, wound infections and bacteriæmias due to *Escherichia coli*, *Bacillus proteus*, *Pseudomonas aeruginosa* and *Aerobacter aerogenes*. Plague. Meningitis due to all Gram-negative bacilli. Infections due to *Klebsiella*. *Shigella* dysentery.

Occasionally Effective In—

Certain infections due to Gram-positive organisms and streptomycin-sensitive strains of organisms when they do not respond to penicillin. (It is to be emphasized that penicillin is the drug of choice in the treatment of these infections, except diphtheria, and only rarely is streptomycin of clinical value.) Bacteriæmia and septicæmia due to hæmolytic streptococci. Endocarditis due to green-producing streptococci (virid). *Staphylococcus aureus* infection. Anthrax. Diphtheria (but ineffective against toxin; therefore antitoxin should always be the primary treatment).

Partially Effective, but Extent of Usefulness Still Undetermined in—

Pertussis, tuberculosis, leprosy, gonorrhœa.

Generally Not to be Used at Present in—

Typhoid fever, paratyphoid fever, amœbic dysentery, undulant fever, toxoplasmosis, histoplasmosis, acute rheumatic fever, disseminated lupus erythematosus, localized lupus erythematosus, infectious mononucleosis, pemphigus, acute and chronic leucæmia, ulcerative colitis, coccidioidomycosis, malaria, poliomyelitis and all other viral infections, blastomycosis, moniliasis, syphilis.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on August 13, 1947, at the Children's Hospital, Carlton, Melbourne, DR. JOHN B. COLQUHOUN, the President, in the chair.

Urinary Incontinence (Double Ureter).

DR. J. G. WHITAKER showed a female child, aged seven years, who had been admitted to the Children's Hospital, Melbourne, on May 27, 1947, with a history of constant dampness of the perineum dating back at least twelve months. Excretion pyelography on March 28, 1947, had shown a double left kidney and ureter, while the outline of the right kidney was obscure. On June 9, 1947, a retrograde pyelogram revealed two left ureters, but the right ureteric orifice could not be found. The condition was considered to be a case of rudimentary right kidney and ureter opening into the urethra or vagina. Exploration of the right renal area was performed on June 26, 1947, but no renal mass was detected. The child was readmitted for further tests on August 12, 1947. Swabs of wool placed in the vagina yielded a fluid of urea content equivalent to two or three millilitres of normal urine. Dr. Whitaker recalled that Dr. Charles Osborn had presented a patient with a similar condition to the Melbourne Pædiatric Society about ten years previously. Dr. Osborn had intervened surgically with a highly successful result.

DR. A. P. DERHAM said that Dr. Osborn's case was a dramatic one, and was very capably dealt with. He could recall two other cases, both of which were rather extraordinary. Two years after the presentation of Dr. Osborn's patient, Dr. Derham had met two colleagues in the radiological department of Bethesda Hospital. They were discussing their patient whilst waiting for the films to be developed. The story concerned a young typist with the same distressing symptoms. Dr. Derham said that he warned his colleagues that they would more than likely find that she had an aberrant ureter opening into the urethra. This proved to be so. The other instance was that of a doctor's daughter, aged fifteen years, with the same symptoms. Dr. Osborn carried out an excretion pyelogram. On one side the child had a partly bifid kidney and double ureter. The second ureter ended as a blind sac. There was no evidence of any opening into the urethra and Dr. Osborn did not operate. Dr. Derham said that the patient was now a healthy young woman of twenty-five years, and, as far as he knew, the symptoms had disappeared.

DR. ROBERT SOUTHBY said that he had seen Dr. Osborn's patient and indeed had presented her to Dr. Robert Hutchison when he visited Melbourne in 1935. Dr. Whitaker's patient did not present the usual clinical picture of renal incontinence. Subjects of renal incontinence had an aberrant ureter on one side and a normal one on the other. They passed normal amounts of urine at ordinary intervals and yet were continually wet because of the aberrant ureter opening into the urethra. This child was not as wet as a subject of true renal incontinence. Her condition suggested that she might have a small communication of one of the ureters into the urethra, resulting in continual seepage without a free flow. Dr. Southby asked Dr. Whitaker whether during the cystoscopic examination he had observed any seepage down beyond the body of the cystoscope. That point was observed in Dr. Osborn's case. It might not be so obvious in the case under discussion as the child was not very wet.

DR. LES WAIT said that the child had been brought to the out-patient department because of attacks of abdominal pain for which the appendix had been removed by a private practitioner. Excretion pyelography was carried out because

of the nature of the incontinence. The urine examined in the out-patient department was microscopically free from abnormality, but the child had just completed a course of sulphadiazine.

DR. GWEN VILLIERS asked Dr. Whitaker whether he had observed during exploration of the abdomen an aberrant kidney which might possibly possess a ureter opening into the urethra. She recalled another case which was not so successful; the patient was left with a persistent fistula after a pelvic operation.

DR. WHITAKER, in reply to Dr. Southby, said that he had not observed any seepage around the cystoscope. Actually the instrument was difficult to pass and some pressure had been needed to insert it. In answer to Dr. Wait, Dr. Whitaker said that the urine had been perfectly normal on several occasions, specimens from both the kidneys and the bladder having been tested. Dr. Villiers's case of persistent fistula was an interesting one. The possibility of an aberrant kidney was always in his mind. He had explored the right renal area without securing an explanation, and proposed to explore the pelvis for an aberrant kidney.¹

Still's Disease with Polydactylitis.

DR. J. W. GRIEVE presented a male child, aged ten years, with swelling of various joints, commencing in the left knee fourteen months previously. In the past the child had suffered from measles, pertussis and varicella. His father, mother and three brothers enjoyed good health. An aunt suffered from rheumatoid arthritis, but there was no family history of tuberculosis. The child had apparently enjoyed good health till fourteen months previously, when on returning from school he complained of a swollen left knee. There had been no other symptoms at that time and he was merely confined to bed. After seven weeks there was no improvement and he was therefore admitted to the Horsham Hospital. Tonsillectomy was carried out without any obvious improvement. A provisional diagnosis was made of tuberculous arthritis of the left knee. The leg was immobilized in plaster and the joint aspirated. Investigation of the fluid for tubercle bacilli was fruitless and the result of the Mantoux test was also negative. About three months after the onset other joints had become involved—the left wrist, the right fourth finger and the right knee in that order. The child was given a course of gold therapy and later penicillin without any obvious response. He was allowed to go home, but soon both ankles became swollen. Pains developed in the hips, the back and the neck, and progressive involvement of the joints took place until, at the time of his admission to the Children's Hospital, Melbourne, on July 18, 1947, he presented a picture of gross polyarthritis. On examination the striking findings were pallor, splenomegaly, generalized lymphadenopathy and polyarthritis, the parts affected being both elbows, both knees, both ankles, both second toes, one right finger, the left wrist, thumb, middle finger and little finger. All joints showed gross swelling which contrasted strongly with the muscle wasting. The fingers had a definite spindle appearance, and an obvious feature was the almost complete symmetry of involvement. There was much restriction of both active and passive joint movements and corresponding tenderness over the affected joints. In some areas the overlying skin was tense and shiny. The result of the Mantoux test was negative at a strength of 1:1000 and no reaction was observed to the Wassermann test. There were sixty polymorphonuclear leucocytes per high-power field on microscopic examination of the joint fluid, but it was sterile on incubation. The serum protein content was 6.6 grammes per centum, made up of albumin 2.4 grammes per centum and globulin 4.2 grammes per centum—the reverse of normal. Charting of the blood sedimentation test gave a straight line indicating quiescence, although that might be related to the alteration in the albumin-globulin ratio. The hæmoglobin value was 50%. The red blood cells numbered 4,470,000 per cubic millimetre and the white cells 20,000 per cubic millimetre, of which 67% were polymorphonuclear leucocytes, 23% lymphocytes, 9% monocytes and 1% eosinophil cells. An agglutination reaction to *Brucella abortus* could not be obtained. A biopsy specimen of a lymph gland from the axilla showed non-specific hyperplasia and no

¹ On August 11, 1947, a laparotomy was performed through a paramedian incision. This revealed two normal left ureters and one apparently normal right ureter. The right ureter was opened and a probe passed up for two or three inches when it met an obstruction. The lower opening was not found. No renal tissue was encountered. The right ureter was tied. The patient was rather shocked after the operation, but the subsequent convalescence was uneventful. The child was finally discharged in good health with no apparent dampness of the perineum.

organisms were grown from it on incubation. Radiological examination of the chest showed a normal cardiac outline. The hilar lymph glands appeared to be enlarged. Increased markings were discernible from the hilum to the apex of the left lung suggestive of vascular changes rather than of infiltration. X-ray examination of the joints showed much rarefaction with soft tissue fusiform swellings about both elbows, the left wrist, both knees, ankles and feet, more pronounced on the left side than on the right. Periosteal thickening was present in the vicinity of most joint changes, especially those on the left side of the body, while dactylitis was visible in many fingers with widening and distortion of outline and loss of bone texture in many metacarpals and phalanges. Dr. Grieve said that the last-mentioned findings were not typical of Still's disease, but suggested rather an inflammatory basis. Epiphyseal development was delayed. Rheumatoid arthritis, however, was the provisional diagnosis, though the dactylitis was an unusual feature. The treatment adopted was the usual routine, together with collaboration with the orthopaedic surgeon. Gold therapy was not universally acclaimed, but was usually employed. The usual routine was to give approximately thirteen intra-muscular injections at weekly intervals of "Myocrisin" to a total dosage of about one gramme. Comroe advised smaller doses—approximately thirty injections to a total dosage of about 0.6 gramme. After an interval of eight weeks the course might be repeated. It was necessary to watch the urine, skin and blood for toxic effects. In the last, agranulocytosis and thrombocytopenia sometimes developed. Dr. Grieve said that treatment entailed thorough teamwork between the physician, orthopaedist, pathologist and physiotherapist. Concerning prognosis, Colver, writing in the *Archives of Disease in Childhood*, August, 1937, had come to the following conclusions after studying 69 patients at Great Ormond Street from 1918 onwards. (i) The disease was self-limited, the average period of activity being nearly four years. (ii) The incidence was highest in the pre-school period; among children in this group the mortality was 30%, while a fatal outcome was rare amongst those in the second half of childhood. (iii) Death occurred in the first three years of activity. If that period was survived, the danger to life was small. (iv) The rate for complete recovery was roughly one in four. Complete recovery was limited to those whose condition became quiescent within three years. (v) Gross crippling was uncommon. Patients who survived could usually earn a livelihood.

Dr. J. GALBRAITH said that he was especially interested in the prognosis. He had seen quite a number of patients with the condition during the years he had spent at Frankston. A week before the meeting he had seen a boy who had been admitted to Frankston ten years previously with rheumatoid arthritis. Gold therapy had been used, but nothing dramatic had been employed in treatment. At present the boy was very well and, indeed, presented a normal appearance. He was working and was engaged to be married. Two or three other patients had given the same impression. The outlook was much better than one would imagine after seeing them in the acute stage.

Dr. COLIN MACDONALD said that the patient presented the characteristic clinical syndrome of Still's disease, but there were unusual radiological features, notably the polydactylitis and the great periosteal reaction around the phalanges and the metaphyses of the long bones, especially around the elbows and knees. Dr. Macdonald said that he had made a zealous search through the literature for parallel findings, but had been unsuccessful. Coffey's "Pediatric Radiology" was a reliable book, and Dr. Macdonald said that he had asked his resident medical officer to write to Coffey in order to see if he had met with the condition. Dr. Macdonald said that he was loath to believe that it was Still's disease alone. The case merited wide circulation in the journals. It was one of the most interesting cases he had reviewed in twenty-five years. He was looking forward with interest to Coffey's reply.

Dr. H. BOYD GRAHAM said that twenty years previously he had shown a patient with syphilitic dactylitis at a clinical meeting. The late Dr. Jeffrey Wood had asked him to make sure that it was not tuberculous in nature. The wisdom of that warning was seen when Dr. Webster obtained a positive result when a guinea-pig was injected with fluid aspirated from the affected part.

Dr. ROBERT SOUTHEY said that Dr. Macdonald had suggested the possibility of a low-grade coccal infection as the basis of the condition. He wondered whether a pathogen selective test had been carried out on the faeces. A course of bee venom was popular treatment for adults, and he wondered whether it was worth while considering for the child under discussion. Dr. Southby recalled an old man who

had responded to those measures; that patient also had tertiary syphilis.

Dr. REGINALD WEBSTER said that he remembered the patient mentioned by Dr. Graham. He could recall also another boy similarly afflicted, whose fingers were in the pathological museum. That child had suffered from generalized tuberculosis and had tuberculous dactylitis as well. The condition was previously known as *spina ventosa* with radiological features characteristic of syphilis, but more often than not it was tuberculous. Dr. Webster said that he had lost faith in the pathogen selection test which had been the vogue many years before. Cultures were grown from the material for study, with the patient's blood as medium. *Streptococcus* or *Staphylococcus aureus* might grow, for example, with total inhibition of the colon bacillus and other organisms. The blood apparently had sufficient bactericidal power to deal with most organisms, but could not cope with the ones that grew. Dr. Webster said that he had used the test frequently in the belief that he was inhibiting certain pathogens, but when the material for study was put up with the patient's blood and with rabbit's blood, the same result was obtained. Most observers argued that blood acted as a differentiating medium, favouring growth of Gram-positive cocci and inhibiting Gram-negative bacilli—a kind of inverse penicillin effect. It was thought that the test might be useful in typhoid fever, but in those cases no culture was, as a rule, grown. He had lost confidence in the test.

Dr. J. G. WHITAKER expressed a hope that the child might eventually find her way to Frankston.

Dr. KATE CAMPBELL said that the reversal of the albumin-globulin ratio suggested a possible hepatic dysfunction of a metabolic nature.

Dr. ERIC PRICE said that an observer saw few cases of the disease and was apt to base his remarks on the small number of patients that were always with us. The patient presented was unique for a rheumatoid subject. It was fair to say that any form of treatment had an immediate beneficial effect, but no permanent effect. None of the methods tried were on the target. He was not convinced by the septic infection or toxic focus theory. The results of therapy directed to that end were extremely disappointing. A response had occurred to all sorts of measures. Some patients have responded to drilling of the bone ends. Dr. Price said that he did not wish to suggest that that might be an effective measure for the patient being discussed, but it was true that the pathological lesion was at the bone ends.

Dr. R. DUNGAN said that the case presented the interesting features of a burnt-out infection, and, as well, reversal of the protein ratio. Gold therapy in adults with liver dysfunction (associated with reversal of the protein ratio) was very liable to produce a rapid toxic reaction. That point should be watched carefully. It had also been observed that such patients did not do well with gold treatment. Something might be achieved by directing attention to general metabolism. It was possible to reverse the serum albumin and globulin ratio. Dr. Dungan suggested that general orthopaedic measures be used, but that in addition the patient be given a diet with a high carbohydrate, high protein, low fat content, along with a high intake of vitamins, especially vitamin C (at least 300 milligrammes daily) and vitamin B. Good results might also be obtained by feeding the patient on amino acids combined, of course, with other general measures.

Dr. H. D. STEPHENS said that he felt that cases of multiple arthritis were of different origins. They could not all be described under one heading. Some were toxic in origin, others metabolic, and so on. Some patients went on for years and then got well. He recalled a woman with multiple arthritis of obscure origin. After twenty years she had been able to get about in spite of considerable reduction of movement in many joints. Vitamins had received some prominence in the discussion of treatment. Large doses of vitamin E had been suggested, but the results were not impressive. They should not lose sight of the value of "N.A.B." in those cases. Reasonable doses of iodide might also be tried. Dr. Stephens said that he had another child, aged two years, with a swelling of the right knee of four days' duration. The patient was afebrile and the knee was very painful. Some effusion had been present at first, but soon disappeared. There was a good deal of periarticular swelling. The results of tests for tuberculosis and typhoid were negative. Penicillin and sulphonamides were administered. During treatment with rest in bed, the other knee began to swell and became flexed. Then swelling in the left wrist developed and later pain in the right wrist. A few drops of turbid fluid had been aspirated from the wrist, but so far investigation of this for evidence of tuberculosis had been unsuccessful. The patient was still under consideration; the condition

appeared similar to that of Dr. Grieve's patient. Both patients were of extreme interest.

Dr. J. B. COLQUHOUN said that he was interested because of the metaphyseal and diaphyseal changes. He had not observed such changes before, but he had seen very few cases of Still's disease. He remembered one child who had ankylosis of several joints. His condition was probably a case of Still's disease that had burnt itself out. The child was allowed to lie in bed in Tasmania, and, of course, the hips and knees became flexed and the feet became badly deformed, but the upper limbs which were used for feeding *et cetera* were much more useful, movement being retained in the shoulders, elbows and hands in spite of the atrophy and destruction of cartilage. It was a pity that those patients were allowed to get into a state of flexion. The knee could be kept more comfortable in splints and pain could be minimized by proper immobilization of the joints. It was possible that a new clinical syndrome had been brought to light.

Dr. J. W. Grieve, in reply, said that the various aspects of the subject had been touched on in the discussion. Dr. Galbraith's experience supported Colver's findings. Dr. Macdonald's remarks were very informative. The literature contained no reference to dactylitis occurring in rheumatoid arthritis. All such conditions were previously thought to be syphilitic or tuberculous in origin. Dr. Grieve said that he had had no experience with bee venom therapy. He was not convinced after reading about it. Dr. Grieve said that he felt apprehensive about employing "N.A.B." and iodide because he felt with Dr. Dungan that there was evidence to suggest liver damage. Dr. Campbell had rightly raised the question of reversal of the serum albumin-globulin ratio. That might serve to explain the unusual blood sedimentation rate reading. It was well known that the blood sedimentation rate was normal in rheumatic heart disease with failure. As soon as the failure was controlled the reading became abnormal and in that condition there was reversal of the usual serum albumin-globulin ratio. The significance might be to indicate a metabolic disturbance, and that might help them to appreciate better the underlying pathology. Dr. Grieve agreed with Dr. Price that poor results followed the removal of so-called septic foci. They were becoming much more conservative and removal of alleged septic foci was only indicated where there was obvious sepsis. Dr. Forbes MacKenzie had observed that patients with rheumatoid arthritis sustaining fracture often improved soon afterwards. That prompted him to attempt boring the ends of the bones. Dr. Grieve agreed with Dr. Dungan that the therapy he had outlined would be worth a trial. The early continental writers had been very keen on dietetic measures for the disease. The condition of the little girl quoted by Dr. Stephens appeared to be an example of rheumatoid arthritis occurring outside the usual age group. Dr. Colquhoun's comments on the maintenance of posture were to be kept in mind. The patients required the exercise of teamwork between physician, orthopaedic surgeon, physiotherapist and pathologist.

Obituary.

WILLIAM JOHN STEWART MCKAY.

WE are indebted to Dr. Robert Scot Skirving for the following appreciation of the late Dr. William John Stewart McKay.

It is never easy to predict correctly what the future career of a medical student may be, even if one knows the individual quite well and the probable surroundings of his life and work. There be many factors to determine its course. Health, influence, ability and good luck all play a part in making a professional success as much now as in the eighteenth century when Samuel Johnson wrote about Mark Akenside, the doctor-poet commencing practice in London.

All such helps may be present, but there remain the rightly great factors of common sense and solid virtue as a man. Yet all these adjuncts may be present and still their possessor's transit through this wilderness may be only mediocre, or even a tragic failure. On the other hand, some persons with little real learning and even with perhaps some honesty and much horse-sense may rise high and die successful men of a sort. With some such reflections I heard with interest and sympathy of the death of William Stewart McKay with whom I had had a lifelong intercourse both personal and professional. How did he fare in life?

McKay was born in Sydney—I think in 1867—and was therefore eighty-one when he died in Lismore a short time ago. His father was a well-known Sydney doctor in the latter part of the nineteenth century and his son William was educated there and later became a science student at the University of Sydney, taking his bachelor degree in that faculty in 1887. He then passed on to medicine and graduated in 1891. To my surprise I can find no record of his being a resident medical officer in any one of the three metropolitan hospitals of that date. I regard this a great bad luck, for the experience gained in such a post is priceless, both professionally and also in the making of lasting friendships and getting one's feet on the stepping stones to later appointments of a senior kind. To this loss I attribute not a few of the handicaps and mischances which McKay met with in his somewhat troubled life. It was in my eyes a very great loss. His only residentship, so far as I know, was in London at the Soho Hospital for Women in 1892.

Apparently soon after graduation he went overseas to various places of medical study in Europe and America, but his chief place of study was really Birmingham, where he met Lawson Tait who became his master and his hero—an



association which profoundly influenced his life both for good and some evil! His own account of their first meeting is really quite worth transcribing because it is typical of both Tait and McKay with their common natural ability to be difficult and aggressive. However, suffice to say that all went well in the end, and the pushing young Australian, wonderful to relate, impressed Tait; the former got the post he sought, and the latter, as himself later wrote, got "the best assistant he ever had"! Praise indeed from such a man. I am glad to think of the joy William John Stewart McKay felt when he got this job he so much desired and found that he could satisfy his master and deliver the goods. The friendship thus made lasted as long as Tait lived his useful and aggressive life.

Well, time passed usefully, and McKay no doubt absorbed much surgical and other knowledge, but too soon it was necessary, for reasons which I fear were financial at home, for him to return to Sydney and face the fact that he must earn a living not only for himself, but to help his family of which he became the king-pin, as his father died just about this turning point in his career.

The Lewisham Hospital was then in its inception under the wise direction of a very able Mother Rectress, and McKay became surgeon to it, and remained on its active staff for over thirty years. He put up his plate in the

neighbourhood and began practice. Patients soon came and he blossomed professionally and financially. But there were also a few thorns about, and he sometimes met them end on, and they were sharp, for he had quite a small flair for making enemies within the profession, and he was not always popular with the old standards of the British Medical Association. Such friction did him no good, and he certainly did not offer his other cheek to his opponents. I do not think it ever crossed his mind "that sweet language might multiply friends and a fair speaking tongue increase kind greetings". Such indeed was not the way with Lawson Tait, nor was it that of his ardent disciple; and so he drifted away at times from being liked by many of his fellows, and thus set against him many possible well-wishers—seniors in years and important figures in the medical life of Sydney. William John Stewart McKay was a fighter and naturally a bit of a warrigal—and he suffered from it—sometimes not unjustly.

McKay was never on the honorary staff of any one of the three large metropolitan hospitals—and never held a teaching post. More is the pity—for several reasons, for such posts might have mitigated McKay. But he grew up with the Lewisham Hospital which ultimately became quite a large institution with both public and private wards. He faithfully worked therein in his strenuous years, and had a wide field of surgical experience of which he made full use.

He gave up his local practice in the western suburbs and put up his plate in Macquarie Street, and there it remained till he left Sydney and lived in Lismore during the last years of his varied and sometimes troubled life. It would be difficult to exaggerate the importance of McKay's long service in the Lewisham Hospital. It made McKay and McKay made it.

He really studied his cases and his reading was wide—no one among us, except perhaps Thomas Flaschi, followed the advances of medicine in journals more closely. I remember many years ago being asked to see a strange case with him—and it was indeed a strange case. A gross thyroïd-looking creature with some of the stigmata of femininity about her—but just a caricature of womanhood—more repellent than even an extreme example of cretinism, another manifestation of an internal secretion gone wrong. This poor woman, for indeed she was one, had become huge and coarse, with profuse hair growing where it ought not on face, chest, back, and up to the umbilicus. She spoke in a slow deep harsh raucous voice, almost bestial in its tones—and this deplorable metamorphosis had come on I think within two years. I might even describe it as a kind of grotesque sort of palimpsest of the two sexes. Horrid to see. I am sure I did not know what was wrong, but W.J.S.M. at any rate gave some sort of explanation of the queer freak before us. He said that very recently he had read of exactly similar changes, and they were associated with a gross suprarenal lesion. As a matter of fact this also proved to be a similar condition. As I drove home I thought of the learning and vision of this man, who had sought my opinion, with the sour inward conviction that he should have been the consultant and not I. And that was not the only occasion where his up-to-date knowledge made him remarkable. In matters indeed of obscure diagnosis he certainly shone. Indeed I do not hesitate to use that often misapplied adjective and say he was brilliant, but, at times, I fear, in treatment, I distrusted his judgement, for his ideas seemed to carry his activities beyond my conservative notions of safety. All the same it was a pleasure to meet him at the bedside. It was stimulating and provocative, and sometimes amusing, for he had a queer mordant wit of his own, and after his unfortunate habit, he sometimes used it out of due season and made needless enemies thereby.

He came, as I said, into Macquarie Street, that desired front seat in the region of specialists, and so between it and Lewisham Hospital he built up a good consulting and operating practice, general, with some definite leaning "Down South" in the pelvis.

Money was plentiful in these years, and it was mostly spent generously, sometimes extravagantly, and not seldom, I fear, unwisely. If McKay could not keep money, at least he spent it with a fine gesture. Houses, gardens, cars and books and help to others deserving or the reverse. He wrote an often quoted book about horses—"Bloodstock"—but he, not so admirably, followed them on the turf, where he indeed occasionally came off with "a packet", but in the end, like most people who bet, the money earned in one of the finest and most useful ways in the world was lost, and fell into the hands of that most useless class of men, the practitioners of the craft of chance. No account of this strange mixed character could omit his deplorable addiction to racing. I dare say several fair fortunes were earned and so lost during his long years of large practice.

McKay's travels overseas were fairly wide, but, as I said, the main influence in his professional outlook was his association with Lawson Tait, at that time the most forceful and original worker in the more or less unexplored fields of abdominal surgery.

I do not intend to discuss here Tait's work, but merely to emphasize the lasting influence it had on his pupil McKay. Tait was a truly brilliant man of aggressive and often unpleasant manners. He looked suggestively like the great Sir James Simpson and it was widely thought that he was the son of Sir James. I saw Tait once when he came to Edinburgh to do the first cholecystotomy ever performed in the Royal Infirmary there. I think, however, that it was especially in the ills of the pelvis and perineum that he justly earned his world-wide fame. McKay was indeed an industrious pupil and imbibed knowledge, courage and vision at the hands of this pugnacious chief.

If, on the one hand, he learned so much of the art and craft of surgery it was all to his subsequent good, but I fear he also learned just how not to do it with regard to his fellow practitioners. Indeed it was just this lack of allowing for the viewpoints and sensibilities of others that made McKay unpopular and perhaps rather an Ishmael in the milieu of the medical life of Sydney in these far-off days. This was regrettable, for this lack of sweet reasonableness must have done him lasting harm. His brains, his originality, and his true love of science for its own sake did not save him from needless misunderstandings and some actual quarrels, for he occasionally said, wrote or did various regrettable things which filled some of us, not without blemish ourselves, with resentment or aversion, although one soon found oneself liking him again.

His "Life" of Tait was a real labour of love and presents a first-hand picture of that robust controversialist in a most convincing way. W.J.S.M. had a devouring curiosity about many branches of knowledge. He was an omnivorous reader of philosophy, medicine, history and the natural sciences in which he had gained his bachelor of science degree. He could write arresting English, and he loved to write or to say provocative paradoxical opinions—sometimes inaccurate. He was also a bit of a *poseur* and tried a little to startle his audience.

In appearance, too, he rather copied his master Tait, who himself was curiously like his supposed father, Sir James Simpson. If one looks at the photographs of these people one is struck by their similarity, the large head, flowing locks and heavy figure. This imitation used to amuse me. But McKay was much else than an imitator or a *poseur*, for I truly think he possessed one of the few really original minds in our profession in my time.

The Australian graduate, up to, say, eight years ago, got as good a professional education as anywhere—and the result was commonly a most resourceful and competent practitioner; yet, among all the hundreds of Australian doctors from whatever school, up to, say, twenty years ago, I cannot call to mind more than a handful of truly scientific medical men with vision and an outstanding mentality. No doubt I forget a few, but, as I write, I can think only of these few stars. Four of them were home products. George Bennett, a real physician-natural, I am proud to remember I saw him in consultation with Dr. Goode in the year he died in 1893 and about whom I hope Dr. Crowther will yet write. Bancroft, of Brisbane, whose name is rightly linked with filaria. Davies Thomas, who wrote admirably about hydatids. Hamilton Russell, a house surgeon with Lister, and Elliot Smith, born in New South Wales, the anatomist, all famous men. And I venture to add here the less known name of Stewart McKay.

I am not unmindful of the galaxy of native born Australasian talent of later years such as John Hunter, Mackenzie Rutherford and Florey, who, it is our pride to remember, came from these ultimate outposts of the British race. "*Sidere mens eadem mutato*." Nor do I forget those others who bloomed in our country, but alas it could not keep them, such as Almoth Wright, Charles Martin, Wood Jones and others who returned to England.

In McKay's earlier days he worked mostly on purely scientific material, but, as the list I append will show, he contributed many papers on professional subjects. He was a keen student of Dante and actually collected and gave his Italian books, some 300 in number, to the University of Sydney. I can find no account of any articles he may have written about Dante.

In the Mitchell Library I actually found no less than 31 articles to his credit, some of them record work which deserves our respect—and these papers are not the complete list of his scientific and literary output. Among them are several quite admirable books, historical as well as medical.

It may be of interest to glance at the excerpts from the Mitchell Library collection which the staff of that admirable institution were good enough to make for me.

Well, I might write a longer or more anecdotal tale of this interesting member of our profession, but I think I have said sufficient to let those who never knew him realize that his was no commonplace character.

He had many faults, but they were largely balanced by his good points. He was learned, industrious and original—and had a truly broad scientific outlook, not only on purely professional subjects, but also on many others. I know no other doctor who so understandingly loved our lesser brethren—birds, beasts, fish, reptiles, and the green things of the earth about which he knew so much.

He left Sydney in 1933 with perhaps the intention of returning there, but he did not do so and finally settled in Lismore and lived there till he died. In these later years it may be that he passed through many grey days, but happily he had a well-stocked mind and he interested himself in local history and wrote various articles about men and places full of information and interest.

He married in 1936 Miss Muriel G. Fraser, who survives him. In these last years of his life the presence of this lady in his home must have been an abiding support in the time of fading strength and long shadows.

It is difficult and perhaps needless to assess the value of McKay's career. I have to admit that with his ability he might have been a wider trail breaker in abdominal surgery or in the advancement of specialized techniques. Certainly he might have made a better job of life as a business, but in that lack he was always his own worst enemy. Nevertheless he had his successes, though few heard of them. He helped some lame dogs over stiles. He was a good son and loyal to his family and those he liked. I think he was a good hater! He was generous with an open hand to poor folk—to people he liked he was kindness itself, and, in lots of ways, he was quite unworldly. We all knew him for a learned all-round medical man and I looked at him in most things with respect and affection. He had, as I have said, definite failings in his make-up, and in this little posy of recollections I have not hesitated to refer to some of them; indeed without my doing so this small sketch would lack essential points. Cromwell told his limner to paint in the warts on his face, and so I also have not spared Bill McKay in my picture.

I am indebted to Mrs. Lawson, his niece, to the staff of the Mitchell Library, and to the Registrar and Librarian of the University of Sydney for courtesy and help in the compilation of these notes.

Some Publications of William John Stewart McKay.

- "Development and Structure of the Pineal Eye in Hinulia and Grammatophora", *Proceedings of the Linnean Society of New South Wales*, Series 2, Volume III, 1888.
- "On the Development and Structure of the Pineal Eye in Hinulia and Grammatophora", *Reports of the Australasian Association for the Advancement of Science*, Volume I, 1888.
- "Inter-coxal Lobe of Certain Crayfishes", *Proceedings of the Linnean Society of New South Wales*, Series 2, Volume II, 1887.
- "The Abolition of the Drainage Tube in the Operative Treatment of Hydatid Cysts", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1920, page 6.
- "Admiral Rous, Discoverer of the Richmond River", *Richmond River Historical Society Journal*, Volume II, 1938, page 60.
- "Allergy Gout", *The Medical Press and Circular*, Volume CCI, 1939.
- "Appendicitis—When and How to Operate: A Guide for the General Practitioner", 1936.
- "Differential Diagnosis in Abdominal Lesions", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1918, page 187.
- "Evolution of the Endurance, Speed and Staying Power of the Racehorse", 1933; Second Edition, 1937.
- "The History of Ancient Gynaecology", 1901.
- "Homologies of Borders and Surfaces of the Scapula in Monotremes" (with J. T. Wilson), *Proceedings of the Linnean Society of New South Wales*, Series 2, Volume VIII, 1893.
- "Hydatid Cysts of the Lung and their Surgical Treatment", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1926, page 7.
- "Lawson Tait", *Journal of the University of Sydney Medical Society*, January, 1917.
- "Lawson Tait—His Life and Work: A Contribution to the History of Abdominal Surgery and Gynaecology", 1922.
- "Lawson Tait's Perineal Operations and an Essay on Curettage of the Uterus", 1897.
- "The McKay-Lewisham Method of Blood Transfusion", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1916, page 217.
- "Morphology of the Muscles of the Shoulder-Girdle in Monotremes", *Proceedings of the Linnean Society of New South Wales*, Series 2, Volume IX, 1894.

- "Notes on Technique in Prostatectomy and Ureterotomy", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1915, page 209.
- "Observations on the Anatomy and Poison of the Dog Tick, *Ixodes Holocyclus*", *Journal of the University of Sydney Medical Society*, March, 1928, page 93, and June, 1928, page 20.
- "Operations on the Uterus, Perineum and Round Ligaments", 1909.
- "Osteology and Myology of the Death Adder (*Acanthophis Antartica*)", *Proceedings of the Linnean Society of New South Wales*, Series 2, Volume IV, 1889.
- "The Preparation and After Treatment of Section Cases", 1905.
- "Racehorses in Australia", edited by W. J. S. McKay and others, 1922.
- "Richard Craig, Discoverer of the Clarence River", *Richmond River Historical Society Journal*, Volume II, 1938, page 56.
- "The Role Played by the Physician and Surgeon in the Treatment of Graves's Disease", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume II, 1920, page 357.
- "A Simplified Sacral Proctectomy", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume II, 1921, page 365.
- "Some Points in Surgical Technique", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume II, 1922, page 148.
- "Some Points in the Evolution of Abdominal Surgery during the Nineteenth Century", *Journal of the University of Sydney Medical Society*, October, 1917, page 134.
- "Some Useful Things for the First Year of Practice", *Journal of the University of Sydney Medical Society*, May, 1923, page 22.
- "The Spaying of Cows", *Agricultural Gazette of New South Wales*, 1894.
- "Use and Abuse of the Drainage Tube in Operations on Hydatid Cysts", *Australasian Medical Congress (British Medical Association), Transactions of the First Session, Melbourne, 1923* (Supplement to *THE MEDICAL JOURNAL OF AUSTRALIA*, February 16, 1924), page 118.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR APRIL.

The Melbourne Permanent Post-Graduate Committee announces the following programme for April, 1948.

University Classes.

Courses for candidates for Part I M.D., M.S., D.O., D.G.O., D.D.R., D.T.R.E. and D.A. examinations, which were commenced in March, will be continued on Monday and Wednesday afternoons. Section I of the pathology class is a suitable introduction to pathology for candidates preparing for any post-graduate degree or diploma.

A course in gastro-intestinal conditions including liver disorders, suitable for candidates for M.R.A.C.P. and M.D. (Part II) examinations, has been arranged by Dr. John Horan as follows: Tuesday, April 13, "Peptic Ulcer", by Dr. Horan; Thursday, April 15, "The Diarrhoeas", by Dr. John Cahill; Tuesday, April 20, "Cirrhosis and Hepatitis", by Dr. M. V. Clarke; Thursday, April 22, "Intestinal Ulceration", by Dr. F. V. Connaughton; Tuesday, April 27, "Radiology in the Diagnosis of Dyspepsia", by Dr. E. W. Casey; Thursday, April 29, "Gastroscopy in the Diagnosis of Dyspepsia", by Dr. Horan.

Course at Sale.

A week-end refresher course will be conducted at Sale on April 10-11. Saturday: 2.30 p.m., Dr. R. Officer on the surgery of jaundice; 8 p.m., Dr. J. G. Hayden on cardiologic problems in general practice. Sunday: 10 a.m., Dr. R. M. Rome on maternal care in the post-natal period; 2 p.m., Dr. M. Powell on the problem of fluid balance in the child.

The fee for this course is £2 2s., and enrolments should be made with Dr. D. I. Fitzpatrick, 52, Cunninham Street, Sale, telephone 174.

Course at Geelong.

The second demonstration in the refresher course at the Geelong Hospital will be conducted at 8.30 p.m. on Wednesday, April 14, by Dr. A. J. M. Sinclair on signposts in mental and nervous disorders. Dr. N. W. Morris, "Belleville", Ryrie Street, Geelong, will make enrolments.

Inquiries and enrolments for courses other than those at country centres should be made at the committee's office, College of Surgeons, Spring Street, C.I., telephone JM 1547-8.

The Royal Australasian College of Surgeons.

FOURTH AWARD OF GORDON CRAIG SCHOLARSHIPS.

THE Council of the Royal Australasian College of Surgeons has announced that, after considering applications for the fourth award of Gordon Craig Scholarships, the following awards have been made: Justin Paul Fleming, New South Wales, Half Travelling Scholarship; Peter Howard Greenwell, New South Wales, Travelling Scholarship; James Rupert Magarey, South Australia, Travelling Scholarship; Leonard James Thomas Murphy, Victoria, Travelling Scholarship; Alan Cathcart Ritchie Sharp, New South Wales, Half Travelling Scholarship.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Brown, Shirley le Vance, M.B., B.S., 1942 (Univ. Sydney), 33, Shirley Road, Wollstonecraft.

The undermentioned have been admitted as honorary associates of the New South Wales Branch of the British Medical Association:

Cropley, David Oswald, 24, Conway Court, 4, Blue Street, North Sydney.

Degotardi, Colin B., Eucalyptus Road, Gordon.

Gale, Barry Mitchell, 188, Merrylands Road, Merrylands. Swenson, Patricia, The Raymond, Elizabeth Bay Road, Elizabeth Bay.

Medical Appointments.

Professor D. H. K. Lee and Sir Norman Kater have been appointed members of the Committees of the Council for Scientific and Industrial Research for Queensland and New South Wales respectively.

Dr. Henry Erskine Downes, Dr. Reginald Ernest Richards, Dr. Donald Augustus Dowling, Dr. George Howard Moore, Dr. John Bryan Mathieson, Dr. Harry Wyatt Wunderly and Dr. Norman William Hansard have been appointed medical testing officers under the provisions of the *Motor Traffic Ordinance*, 1936-1947, Australian Capital Territory.

Sir Constantine T. C. de Crespigny, Dr. K. S. Hetzel, Dr. F. R. Hone, Dr. E. B. Jones, Dr. G. A. Lendon and Dr. E. McLaughlin have been appointed to be a panel of medical referees under the provisions of Section 97 (a), Subsection 7, of the *Workmen's Compensation Act*, 1932-1944, of South Australia.

Dr. R. F. Matters has been appointed honorary gynaecologist to the sterility clinic of the Royal Adelaide Hospital, Adelaide.

Dr. F. I. Flaherty has been appointed honorary clinical assistant to the dermatological section of the Royal Adelaide Hospital, Adelaide.

Books Received.

"The Causation and Treatment of Delayed Union in Fractures of the Long Bone", by Kenneth W. Starr, O.B.E., E.D., M.B., B.S. (Sydney), M.S. (Melbourne), F.R.C.S. (England), F.A.C.S., F.R.A.C.S.; 1947. London and Australia: Butterworth and Company (Publishers), Limited. 9½" x 6½", pp. 248, with many illustrations, some of them coloured. Price: 53s. 6d.

"The Biological Standardisation of the Vitamins", by Katharine H. Coward, D.Sc.; Second Edition; 1947. London: Baillière, Tindall and Cox. 8½" x 5½", pp. 232, with illustrations. Price: 16s.

"Modern Drugs in General Practice", by Ethel Browning, M.D., Ch.B.; Second Edition; 1947. London: Edward Arnold and Company. 8½" x 5½", pp. 232. Price: 12s. 6d.

"Stammering: Its Nature, Causes and Treatment", by Kate Emil-Behnke; 1947. London: Williams and Norgate. Melbourne: Wyatt and Watts Proprietary, Limited. 7½" x 4½", pp. 100, with illustrations. Price: 6s.

"The Secret Instrument: The Birth of the Midwifery Forceps", by Walter Radcliffe, with Introduction by Wilfred Shaw, M.D. (Cantab.), F.R.C.S., F.R.C.O.G.; 1947. London: William Heinemann (Medical Books), Limited. 7½" x 5", pp. 102, with illustrations. Price: 10s. 6d.

Diary for the Month.

MARCH 15.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.

MARCH 16.—New South Wales Branch, B.M.A.: Council Quarterly Meeting.

MARCH 17.—Western Australian Branch, B.M.A.: Annual General Meeting.

MARCH 18.—New South Wales Branch, B.M.A.: Clinical Meeting.

MARCH 18.—Victorian Branch, B.M.A.: Executive Meeting.

MARCH 24.—New South Wales Branch, B.M.A.: Annual Meeting.

MARCH 24.—Victorian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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